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OCTOBER 27, 1941
VOLUME 30, No. 22

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AMERICAN

DYESTUFF REPORTER

Annual Processing Review Number

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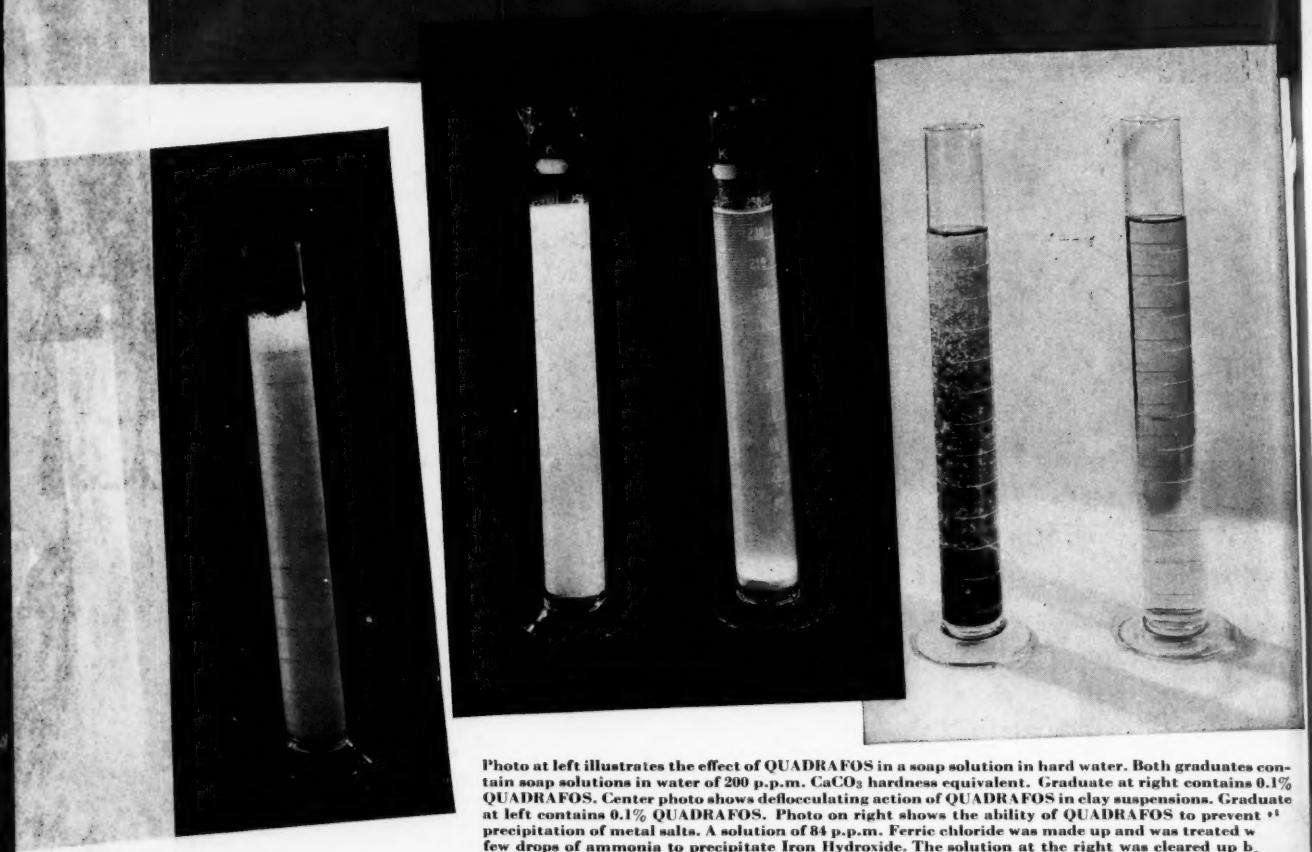

Photo at left illustrates the effect of QUADRAFOS in a soap solution in hard water. Both graduates contain soap solutions in water of 200 p.p.m. $CaCO_3$ hardness equivalent. Graduate at right contains 0.1% QUADRAFOS. Center photo shows deflocculating action of QUADRAFOS in clay suspensions. Graduate at left contains 0.1% QUADRAFOS. Photo on right shows the ability of QUADRAFOS to prevent precipitation of metal salts. A solution of 84 p.p.m. Ferric chloride was made up and was treated w few drops of ammonia to precipitate Iron Hydroxide. The solution at the right was cleared up b addition of 0.5% QUADRAFOS.

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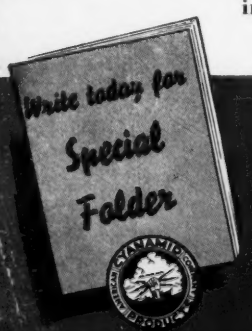

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CERTIFIED FUGITIVE TINTS

FOR ALL PRESENT-DAY

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Annual Processing Review Number

AMERICAN
DYESTUFF REPORTER

VOLUME 30 | OCTOBER 27, 1941 | NUMBER 22

Alphabetical List of
NEW PRODUCTS
Developed Since October 1940

DYESTUFFS
TEXTILE CHEMICALS
EQUIPMENT

Alphabetical List of
MANUFACTURERS
Supplying These Products

WITH the cooperation of the manufacturers of dyestuffs, textile chemicals, and wet processing and laboratory equipment, we have prepared the accompanying list of products which, it is understood, have been placed on the market or further developed since October, 1940. The list of products has been subdivided according to the classification mentioned and the individual products are listed in alphabetical order. The name of the manufacturer, in an abbreviated form, appears in capital letters immediately following the name of the product. In many cases the abbreviated name of the manufacturer will immediately indicate to the reader the full name of the company. However, supplementing and appearing at the end of the list of products, we have listed alphabetically the key name of the manufacturer together with the complete firm name and address.

We have tried to make this list as complete and accurate as possible but there may be some unintentional omissions or errors. If so, we shall be pleased to have such matters called to our attention immediately. We have depended upon the manufacturers to supply us with a complete list of their new products together with information concerning them. The properties claimed for the products are those of the manufacturers. It must be understood, in this connection, that the information we have published is necessarily in a brief form inasmuch as lack of space prohibits the publication of complete details concerning any product. We hope, however, that the information as it appears is sufficiently comprehensive to give the reader a specific idea of the properties and intended uses of the product.

DYESTUFFS

A

Acid Anthracene Brown WSGA—(GENERAL)—a chrome color said to possess many valuable properties. It is said to combine good level dyeing properties with very good fastness to light, to water, to sea-water, and to perspiration. The fastness to washing, to fulling, and to carbonizing is said to be good. It is suitable for dyeing yarns, loose wool, and slubbing, but it is primarily used on piece goods.

Acid Cyanine BFA—(GENERAL)—a bright, acid blue said to possess good fastness to light. It is stated that due to its good all-around properties, Acid Cyanine BFA is very well suited as a base for bright navy blue shades on yarns, ladies dress goods, and hats.

Acid Yellow RC—(CIBA)—an economical color said to possess good light fastness. It has fair wash fastness, but is very sensitive to acid. Recommended by the manufacturers principally for dyeing paper.

Alizarine Blue S APR—(GENERAL)—is an acid dyeing alizarine color which yields bright shades of a reddish blue. It is stated that its good light fastness and very good level dyeing properties make it well suited for the dyeing of worsted piece-goods, hats, carpets and knitting yarns.

Alizarine Red WA Extra PDR—(GENERAL)—a chrome color said to possess many valuable properties. It is usually dyed on a chrome bottom, but can also be dyed by the afterchrome process. It is largely used to produce shades of reds and bordeaux said to be of excellent light fastness on loose wool, slubbing, piece goods and yarns.

Alizarine Yellow 5 GS—(GENERAL)—a chrome yellow of very greenish shade. It can be applied according to the afterchrome, monochrome mordant, or chrome bottom methods and produces dyeings said to be of good fastness to washing, to fulling, to light, and to steaming and of very good fastness to water, to sea-water, and to perspiration.

Alphanol Brown BUA—(GENERAL)—a dyestuff, which, when applied from a weakly acid bath, dyes wool deep shades of brown, said to possess fairly good fastness to light and to perspiration and good fastness to water and to washing. It is used for dyeing fast-to-washing shades on knitting yarns and loose wool. It is also well suited for dyeing shoddy.

Amacel* Brilliant Blue BS Extra—(AAP)—a companion color to Amacel Brilliant Blue B Extra for dyeing Celanese and acetate constructions and aside from the fact that it gives a redder tone of Blue, it is said to be identical in all respects as to brilliancy, pile-on, fastness properties, etc.

* Registered U. S. Pat. Off.

Amacel* Blue 3R—(AAP)—this color compares favorably with SRA Blue III in shade and all of its attributes except that it is said to possess the characteristic of the rapid pick-up, good pile-on group.

* Registered U. S. Pat. Off.

Amacel* Scarlet BS—(AAP)—a scarlet bluer in tone than SRA Scarlet III which is of special interest to dyers of Celanese and acetate fibers. It is said to possess very good light, washing and perspiration fastness. Its dispersion, penetration and pile-on properties are said to be very good, as is its fastness to salt water and crocking. Dischargeability is good. It should also be of interest to nylon hosiery dyers as it strips well with hydrosulfite.

* Registered U. S. Pat. Off.

Amacel* Violet 3R—(AAP)—something new in the form of a Celanese and acetate dye. It produces a reddish tone of Violet said to be of good solubility, excellent dyeing speed, pile-on, dischargeability and above all excellent resistance to acid fading. Fastness to washing and perspiration is good, light moderate.

* Registered U. S. Pat. Off.

Amanil* Developed Scarlet 2BLN—(AAP)—a color which when diazotized with Developer BN produces a scarlet, bluish in tone. It is said to possess very good fastness to water, washing and perspiration while moderate in fastness to light. Solubility good. Dischargeability moderate.

* Registered U. S. Pat. Off.

American SAP Brown Crystals; American SAP Brown Powder—(CALCO)—two very economical water soluble brown coloring matters for the beater dyeing of paper pulp. They are said to possess excellent light fastness and are recommended by the manufacturer for light tans, browns and greys. They are further recommended for low cost water soluble wood stains.

Amido Yellow EA-CF—(GENERAL)—is an acid color said to possess very good level dyeing properties as well as very good light fastness. It is well suited for the dyeing of both piece-goods and yarns. The product is suitable for use on materials which are subsequently rubberized.

Aridye Colors for Drapery Printing—(ARIDYE)—after thorough research and testing, it is claimed that it has been determined that certain Aridye colors withstand over 300 hours in the Fade-Ometer without any let-down in shade. For this reason, the following colors are especially recommended by the manufacturers for drapery printing: Blue FC2G Conc, Blue LC2R Conc, Violet LV3R Conc, Green FJB Conc, Yellow FY2G Conc, Yellow FYK Conc, Brown FWR Conc, and Black FK Conc.

Artificial Silk Black RRA—(GENERAL)—a direct dyestuff suitable for the dyeing of cotton and rayon. On mixed fabrics consisting of cotton and rayon, uniform shades are obtainable. On union fabrics consisting of cotton or rayon and wool, fairly uniform shades are obtainable.

Artisil Direct Yellow RN—(SANDOZ)—an acetate yellow, somewhat on the red side, with a fair degree of light fastness.

Azoanthrene* Brilliant Violet O—(ALTHOUSE)—a new offering in the Azoanthrene wash fast series of direct colors. It is exceptionally bright in shade and discharges white with hydrosulfite. It is stated that it is an ideal color for ground shades which must be discharged. It is said to have excellent washing fastness when aftertreated.

* Registered Trade-mark.

B

Benzanol Fast Violet RR—(ALTHOUSE)—a new bright shade of direct violet which is suitable for white discharges when aftertreated with formaldehyde. It is said to be extremely level dyeing on all types of rayon or cotton yarns and pieces.

Benzaphen* Diazo Red 5BL—(PHOENIX)—a direct diazo color recommended by the manufacturers for dischargeable grounds on cotton or rayon, or for the dyeing of yarns or piece goods wherever rigid fastness requirements must be met. This color is slightly bluer than existing prototypes but is claimed to possess better dischargeability and wash fastness and is fast to acid and alkali.

* Reg. U. S. Pat. Off.

Benzaphen* Yellow 6GCW—(PHOENIX)—a direct dyestuff which leaves acetate white. It is recommended by the manufacturers for dyeing cotton, rayon, and rayon and acetate combination cloth. This product dyes mercerized cotton substantially the same shade as rayon, making it of interest for hosiery dyeing.

It is said to possess excellent wash fastness, is fast to acid and ironing and moderately fast to light.

* Reg. U. S. Pat. Off.

Benzo Bordeaux 7BA—(GENERAL)—a direct dyestuff producing fairly bright shades of a bluish red on the various forms of cotton and rayon. The dyeings can be discharged to a good white with Rongalite C. It is said to be well suited also for dyeing of unions consisting of cotton and wool.

Benzo Copper Blue BR Extra—(GENERAL)—a direct dyestuff well suited for the dyeing of the various forms of cotton or rayon. It produces bright, reddish shades of blue said to be of moderate fastness to washing, to water, and to light and fairly good fastness to perspiration. When aftertreated with copper sulfate, somewhat redder shades are obtained showing improved wet-fastness and very good fastness to light.

Benzo Green GA Conc. — (GENERAL)—a yellowish, direct green of good dischargeability. It is well adapted to the dyeing of cotton, rayon and pure or weighted silk. On union materials of cotton and wool, or rayon and wool, fairly uniform shades are produced.

Benzo Viscose Blue GS Conc—(GENERAL)—a direct color recommended by the manufacturers for use on cotton and, in particular, on rayon. It is said to be distinguished by an attractive, bright shade, by comparatively good wash fastness, and by good dischargeability. It is stated that this represents a combination of properties not usually found in a direct blue.

Benzoform Black RRA — (GENERAL)—a direct color recommended by the manufacturers for the dyeing of cotton and, in particular, of rayon. When aftertreated with Formaldehyde and Acetic Acid, in the usual manner for Benzoforms, it produces full shades of black said to be of comparatively good fastness to washing, to water and to perspiration. It is dischargeable to a good white with Rongalite C in neutral pastes and to a fairly good white with alkaline pastes.

Benzoform Blue BR Extra—(GENERAL)—a direct color recommended by the manufacturers for the dyeing of cotton and, in particular, of rayon. When aftertreated with Formaldehyde and Acetic Acid, in the usual manner for Benzoforms, it produces bright shades of a reddish blue said to be of comparatively good fastness to washing, to water, and to perspiration. It is dischargeable to a very good white with Rongalite C in either neutral or alkaline pastes.

Benzoform Blue GGA Extra—(GENERAL)—a direct color which is recommended by the manufacturers for the dyeing of cotton and, in particular, of rayon. The product is said to be well adapted for the dyeing of material which requires fastness to wet processing beyond that obtainable with ordinary direct colors. Its good solubility makes it well suited for machine dyeing.

Benzoform Blue Green BA Conc.—(GENERAL)—a direct color recommended by the manufacturers for the dyeing of cotton and, particularly, of rayon. The product is said to be well suited for use on materials which require a degree of fastness to wet processing beyond that obtainable with the average direct color. It is dischargeable to a clear white with either a neutral or an alkaline Rongalite C paste.

Benzoform Blue GS Conc.—(GENERAL)—a direct color recommended by the manufacturers for the dyeing of cotton and, in particular, of rayon. When aftertreated with formaldehyde and acetic acid, in the usual manner for Benzoforms, it produces bright shades of blue said to be of comparatively good fastness to washing, to water and to perspiration. The product is further said to be well suited for use on materials which requires a degree of fastness to wet-processing beyond that obtainable with the average direct color.

Benzoform Brown LGA — (GENERAL)—a direct color recommended by the manufacturers for the dyeing of cotton and, in particular, of rayon. When aftertreated with formaldehyde and acetic acid, in the way usual for Benzoforms, it produces yellowish shades of brown said to be of comparatively good fastness to washing, to water, and to perspiration. The product is well suited for use on materials which require a degree of fastness to wet processing beyond that obtainable with the average direct color.

Benzoform Dark Brown VB Extra—(GENERAL)—a direct color recommended by the manufacturers for the dyeing of cotton and, in particular, of rayon. When aftertreated with formaldehyde and acetic acid, in the usual way for Benzoforms, it produces deep shades of brown said to be of comparatively good fastness to washing, to water, and to perspiration. It is stated that it is well suited for use on materials which require a degree of fastness to wet processing beyond that obtainable with the average direct color. It is dischargeable to a good white with Rongalite C in neutral pastes, but is only moderately dischargeable with alkaline pastes.

Benzoform Green GA—(GENERAL)—a direct dyestuff which is recommended by the manufacturers for application on cotton and particularly on rayon. It leaves acetate rayon effects practically white. When aftertreated with chrome and formaldehyde, slightly duller shades of somewhat improved wash fastness are obtained.

Benzoform Grey N—(GENERAL)—a direct dyestuff which is recommended by the manufacturers for application on cotton and, particularly, on rayon. Very good discharges can be obtained with either neutral or alkaline Rongalite C Pastes.

Benzoform Orange FGL — (GENERAL)—a direct color recommended by the manufacturers for dyeing of cotton and, in particular, of rayon. When aftertreated with formaldehyde and acetic acid, in the way usual for Benzoforms, it produces bright shades of orange, said to be of comparatively good fastness to washing, to water, and to perspiration. The product is well suited for use on materials which require a degree of fastness to wet processing beyond that obtainable with the average direct color.

Benzoform Rubine BA—(GENERAL)—a direct dyeing color which is recommended by the manufacturers for use on cotton and, particularly, on rayon. It is stated that this product is well adapted for the dyeing of materials which require fastness to wet processing beyond that obtainable with ordinary direct colors. Due to its good dischargeability and its comparatively good wash fastness, it is of particular interest for discharge work.

Benzoform Scarlet BG—(GENERAL)—a direct color recommended by the manufacturers for the dyeing of cotton and, in particular, of rayon. When aftertreated with formaldehyde and acetic acid, in the way usual for Benzoforms, it produces very bright shades of scarlet said to be of somewhat superior fastness than can be obtained with the average direct scarlet.

Benzoform Yellow 3G—(GENERAL)—a direct color recommended by the manufacturers for the dyeing of cotton and, in particular, of rayon. When aftertreated with formaldehyde and acetic acid in the usual way for Benzoforms, it produces very bright, greenish shades of yellow said to be of comparatively good fastness to washing, to water and perspiration. The product is well suited for use on materials which require a degree of fastness to wet processing beyond that obtainable with the average direct color.

Benzoform Yellow GG Extra—(GENERAL)—a direct color which is recommended by the manufacturers for the dyeing of cotton and rayon. When aftertreated with formaldehyde and acetic acid, in the usual manner for Benzoforms, it produces bright, fairly greenish yellows said to be of comparatively good fastness to washing. It is well adapted for the dyeing of ma-

terials which require fastness to washing beyond that obtainable with the average direct color.

Benzoform Yellow GRA Conc. —(GENERAL)—a direct color recommended by the manufacturers for the dyeing of cotton and, in particular, of rayon. When aftertreated with formaldehyde and acetic acid, in the way usual for Benzoforms, it produces reddish shades of a fairly bright yellow which are said to possess comparatively good fastness to washing, to water, and to perspiration. The product is well suited for use on materials which require a degree of fastness to wet processing beyond that obtainable with the average direct color.

C

Calco Naphthosol Fast Bordeaux GP Base—(CALCO)—a developer recommended by the manufacturers for use in conjunction with Naphthosol AS, or related prepares, for the dyeing and printing of low cost bordeaux or wine shades on cotton, viscose rayon and linen. Shades obtainable are said to possess the characteristic very good fastness properties of the Azoic colors as a class.

Calco Rodol 2R (fur dye)—(CALCO)—recommended by the manufacturers as a very red brown for shading over dark red browns on fur. Its greatest use is in dyeing Mink and Kolinsky.

Calco Rodol Brown PR (fur dye)—(CALCO)—produces a red brown on fur and is recommended by the manufacturers especially as a shading color for dark brown beaver shades.

Calco Rodol HBG (fur dye)—(CALCO)—produces a pale greenish yellow on fur and recommended by the manufacturers for shading light tans and fauns. It is of interest when dyeing foxes and similar light tinted furs.

Calco Rodol PY (fur dye)—(CALCO)—produces a yellow brown shade on fur. Recommended by the manufacturers especially as a shading color for delicate tints in the dyeing of Baum Martin.

Calcochrome Yellow NFC—(CALCO)—a chrome yellow for wool applicable by the three commonly used chrome methods. To the trade that carbonizes after dyeing, Calcochrome Yellow NFC is especially recommended by the manufacturers as a color which does not change shade or weaken when material is in the acid, neutralized or finished condition. Calcochrome Yellow NFC is said to possess excellent fastness to wet finishing operations and to wear.

Calcocid Alizarine Blue SE—(CALCO)—an acid color which produces a bright blue shade on wool, said to be of exceptionally good light fastness. As a component in mode shade formulations such as for taupes, greys and tans which must be proof against water spotting, it is especially recommended by the manufacturers. Its level dyeing and penetrating properties are said to render it adaptable for the dyeing of hat felt.

Calcofast Leather Blue BN—(CALCO)—a medium blue which builds up to a neutral shade navy. This dye is said to penetrate well and give extremely level results. This level dyeing property makes it especially suitable for the coloring of pastel shades or as a shading material where comparatively small quantities are to be used.

Calcofast Leather Orange 4RN —(CALCO)—a bright medium shade orange which is said to possess very good light fastness properties. It is said to dye very evenly, penetrate well, and may be used as a straight color or for shading purposes with equally uniform results.

Calcofast Leather Pink N—(CALCO)—a blue shade red somewhat similar to Calcocid Phloxine 2G. This dye finds considerable application in the production of pastel pinks for which its uniform dyeing and excellent penetration are said to make it especially suitable.

Calcofast Leather Yellow N—(CALCO)—a somewhat greenish shade of yellow said to possess exceptional fastness to light, 256 hours on chrome grain calf with hardly distinguishable change. In addition, this dye is said to give very good penetration and levelness of color.

Calcofast Wool Blue BN—(CALCO)—a metallized dye said to possess exceptionally good-all-around fastness properties and especially so to fulling. It is stated that it more closely resembles in fastness properties a chrome color rather than an acid dye. It is recommended by the manufacturers as a blue component in formulations for dark brown when using metallized dyes.

Calcofast Wool Orange 4RN—(CALCO)—a metallized dye said to possess characteristics of a chrome color. Recommended by the manufacturers, because of superior fastness properties, as a component in formulations for brown on the better grades of woolens and worsteds. Objectionable shade effects, because of carbonizing stains, are said to be eliminated to a great extent by the use of Calco metallized dyes.

Calcofast Wool Pink N—(CALCO)—a recent addition to the Calco line of metallized dyes which is said to more closely resemble, in all around fastness properties, the chrome reds rather than an acid red. It is said to possess exceptional fastness to carbonizing, fulling and washing, and is recommended by the manufacturers for the better grades of woolens and worsteds.

Calcofast Wool Yellow N—(CALCO)—a metallized dye developed by Calco. It is said to be of exceptionally good fastness to light and wet processing. It is recommended by the manufacturers for the better grades of woolens and worsteds, such as American orientals, men's and ladies' wear, carpet yarns and hosiery yarns. The Calco line of metallized dyes is said to be especially adaptable for mixed wool stock which, when dyed with the more common wool colors, produces mottled shade effects.

Calcogene Direct Blue B 100%—(CALCO)—a direct dyeing non-bronzing type of sulfur color which produces a blue of a greenish tone and outstanding in brightness. It is stated that, because of its level dyeing property and excellent solubility, it is recommended for applications in all types of machines common to the trade for sulfur dyeing.

Calcomine Fast Orange 2R—(CALCO)—a direct dye which produces a bright red tone orange and is recommended by the manufacturers for all types of cotton and viscose rayon material. It is stated that, because of its very satisfactory level dyeing properties, it is especially adaptable for the pad dyeing of combination shades. Its fastness to acid is said to be sufficiently satisfactory to warrant its use with other acid fast direct dyes for perspiration fast shades on linings.

Calcomine Fast Scarlet 4BNC; Calcomine Fast Scarlet 4BS—(CALCO)—direct dyes which produces bright scarlet shades on the different types of cotton and viscose rayon material. Either alone or in combination with other suitable direct colors they are recommended by the manufacturers for the padding of piece goods. They possess but slight affinity for animal fibers, if applied in a neutral or slightly alkaline bath, and, therefore, are of interest to the dyer of cotton-wool union material or as the red component in speck dye formulations. Fastness to acid of these two products is said to warrant their consideration for shade effects which should be fast to perspiration.

Calcophyl Blue R—(CALCO)—a vat blue powder for the printing ink trade which is so processed as to render it readily and uniformily dispersable in oil. It is said to be of exceptionally good color value, and finds its greatest use for alkali and light fast tints.

Calcophyl Violet 6R — (CALCO) — a vat violet powder for the printing ink trade which is said to possess very satisfactory dispersion and working properties. Light and alkali fastness is said to be very satisfactory. The latter property making it especially adaptable for wrappers which will contact alkaline products, as for example soap.

Cellitazol ONS Soluble — (GENERAL)—an addition to the present range of water soluble, developed blacks for dyeing acetate rayon. It can be applied to fabrics or yarns and likewise to mixed fabrics containing acetate rayon. Being a soluble type rather than a dispersed one, it is said to penetrate piece goods, yarns, and tops quickly and completely.

Celliton Fast Black BA — (GENERAL)—a dispersed, direct dyeing acetate dyestuff said to be of good dyeing and penetrating properties. It dyes full shades of bluish black said to possess very-good-to-excellent fastness to light. It also serves as a valuable base for the production of shades of grey.

Celliton Fast Blue FFRS Extra Conc. —(GENERAL)—a dispersed, direct dyeing acetate blue of an exceptionally bright shade. It is said to possess excellent dyeing and penetrating properties. It also has good affinity, even at low temperatures.

Celliton Fast Purple D—(GENERAL) —is a dispersed, direct dyeing acetate dyestuff which produces bright, bluish violet shades said to combine good all around fastness with excellent fastness to light.

Celliton Fast Yellow GA — (GENERAL)—a dispersed, direct dyeing, acetate dyestuff which produces bright, fairly greenish shades of yellow said to be of very good fastness to light. It is of excellent dispersion. It is not affected by diazotizing and developing with Developer ON and can, therefore, be used for shading developed types.

Celliton Fast Yellow RRA—(GENERAL)—a dispersed, direct dyeing color for acetate rayon. It produces bright, fairly reddish shades of yellow said to possess very good fastness to light. It is well suited for direct printing on acetate rayon. It does not sublime under ordinary conditions.

Celliton Scarlet BA and Celliton Scarlet BA for Printing — (GENERAL) — dispersed acetate dyestuffs which yield, in dyeing and printing, respectively, bright and fairly yellowish shades of scarlet, said to be of good fastness to light. They also produce desirable pinks when applied in the proper proportion.

Celliton Violet 3 RA—(GENERAL) —a dispersed, direct dyeing acetate violet of bright reddish shade. It is said to possess very good dyeing and penetrating properties and has good affinity, even at low temperatures. It is well suited for dyeing on the jig or in the box. It will be found valuable for the production of a large range of shades, including deep shades of wine and bordeaux.

Chloramine Bordeaux 7B — (SANDOZ)—a direct dyestuff, said to be very brilliant in shade, white dischargeable, and very level dyeing. It stands waterproofing without material change of shade. Also dyes a good union on rayon and cotton.

Chrome Fast Yellow ME—(CIBA)—a color recommended by the manufacturers for all wool dyeings of maximum fastness requirements, especially government service shades. An unusually level dyeing color, it can be applied either top chrome or metachrome. Viscose and acetate rayon are reserved white. It is said to be particularly outstanding in its fastness to light, carbonizing, milling, fulling and peroxide bleaching.

Chrome Red BBC—(CIBA)—an economical red for dyeing woolen piece goods. It is also an excellent silk white color and therefore useful for all fabrics with silk effect threads. It is recommended by the manufacturers principally for top chrome dyeing, whereby it is said to produce very level shades of good fastness to light. It discharges white.

Ciba Red 3B Micro Powder; Ciba Blue 2B Micro Powder — (CIBA) — these colors represent new and improved forms of these well known types. They are recommended by the manufacturer for padding and dyeing either by the reduced method or pigment method.

Cibacete Black BGL — (CIBA) — an economical direct dyeing acetate black. Also used as a start for greys on all acetate and acetate and rayon mixed fabrics.

Cibacete Printing Grey RLN New—(CIBA)—a screen printing color, said to possess excellent dispersibility, for acetate rayon fabrics, that has given satisfaction in practical application.

Coprantine Yellow GRLL; Coprantine Orange 2BRL; Coprantine Brown 5RLL; Coprantine Brown RL; Coprantine Violet Brown BL; Coprantine Black Brown S; Coprantine Blue GLL; Coprantine Blue RLL; Coprantine Grey RRLL; Coprantine Grey GGL—(CIBA) —these represent a new series of direct dyestuffs unique in the fact that they are said to possess very good fastness to both light and washing. They are recommended by the manufacturers for yarn and piece goods dyeing of cotton and rayon, but are not sufficiently dischargeable to be used as ground shades for prints. A simple direct dyeing is followed by aftertreatment and soaping. These colors should be especially adaptable to spun rayon fabrics on which it is difficult to meet the demands for both light and wash fastness.

D

Diamine Bronze Brown PEN—(GENERAL)—a direct dyestuff suitable for dyeing vegetable fibers in their various forms. On mixed fabrics of cotton and rayon, it produces dyeings said to be of excellent tone-in-tone effect.

Dianil Yellow 5GA—(GENERAL)—a bright, greenish direct yellow suitable for dyeing both cotton and rayon, piece-goods as well as yarn. It is claimed to be especially useful for the production of brilliant shades of yellow and of bright greens where fastness to light is not a requisite.

Diazo Brilliant Orange GRN Extra—(GENERAL)—produces, when diazotized and developed with Developer AMS, exceptionally bright, reddish shades of orange said to possess fairly good fastness to washing. With Developer ZA, it produces bright shades of golden orange of similar properties. It is suitable for dyeing the various forms of cotton or rayon. It can be discharged to a good white with Rongalite C.

Diazo Brown 3 RNA—(GENERAL) —produces, when diazotized and developed with Developer AMS or Developer MT, reddish shades of brown said to possess fairly good fastness to washing. It is suitable for dyeing the various forms of cotton or rayon. It can be discharged to a fairly good white with Rongalite C.

Diazo Fast Yellow 3GA — (GENERAL)—produces, when diazotized and developed with Developer ZA, bright, greenish shades of yellow said to be of fairly good fastness to washing and to light. It is suitable for dyeing the various forms of cotton or rayon. It can be discharged to a very good white with Rongalite.

Diazophenyl Fast Green 2 GL—(GEIGY)—a color producing pleasant shades of green when diazotized and developed with Developer Z, said to possess excellent dischargeability, both alkaline and neutral, and to leave acetate effects clean. Most important of all, it is said to possess excellent resistance to light.

Diphenyl Bordeaux 6 B—(GEIGY)—a bright bordeaux of good money value which is said to possess excellent resistance to acid. Because of this property, it should

come in very useful for various cotton and rayon fabrics that must withstand a certain amount of water-proofing. It is stated that this bright shade of bluish red is particularly desirable for knit-goods, possesses good dischargeability and leaves acetate effects clean.

Direct Bordeaux 6B—(CIBA)—an exceptionally bloomy bluish red for cotton and rayon. Also good for cotton and wool unions. Hydrosulfite discharge is said to be excellent. Acetate rayon is reserved a pure white.

Direct Brilliant Blue 5BC—(CIBA)—a reddish blue for cotton and rayon that is said to be unsurpassed in brilliancy of shade. Because it discharges to a pure white it is largely used for bright blue ground shades for discharge printing. Acetate is reserved white. It is sensitive to alkali and for best dyeing results should be dyed in a short neutral bath with plenty of salt.

Direct Brown G—(GENERAL)—a direct dyestuff suitable for the dyeing of cotton, rayon and other vegetable fibers in their various stages of manufacture, producing red brown shades said to possess good fastness to acetic acid, alkali and ironing.

Du Pont Naphthanil* Special Bases—(duPONT)—duPont Naphthanil Orange GC 50 Base (P.A.F.); duPont Naphthanil Bordeaux GP 50 Base (P.A.F.); duPont Naphthanil Red B 50 Base (P.A.F.); duPont Naphthanil Scarlet RC 50 Base (P.A.F.); duPont Naphthanil Blue B 50 Base (P.A.F.); these special bases represent a new line of stabilized standards suitable for textile printing. They are the result of a considerable amount of research and experimentation and are claimed to fill a definite need for bases possessing good stability in printing pastes thus obviating the necessity for making up fresh pastes for each new run. These products are said to be much more stable than the regular bases, yet they possess the same application and fastness properties. It is stated that printers will find them economical to apply despite the fact that they are slightly more expensive than the regular bases. While the Special Bases may be used for dyeing, no advantage in stability can be claimed for them over the regular bases. Both types have the same stability in diazo solutions but it is only in printing pastes that the "50 Bases" are superior.

* Registered Trade-mark.

F

Fast Light Yellow GGX Conc.—(GENERAL)—a widely used, level dyeing, fast-to-light, acid yellow yielding bright shades of a greenish yellow. It finds considerable application in the production of combination shades on such materials as dress goods, carpet yarns, and upholstery, together with other fast-to-light and level dyeing acid colors.

Fastolite Brilliant Bordeaux RL—(ALTHOUSE)—a bright shade of direct Bordeaux which is said to be fast to light. Brighter shades of wine and bordeaux can be formulated with this color than with mixtures of Fastolite Red 8BL. It is said to be extremely level dyeing and is applicable to yarn, stock and pieces. It is an excellent jig dye.

Fastusol Orange L5GA—(GENERAL)—a direct color suitable for producing, on the various forms of cotton, fairly bright shades of orange said to be of very good fastness to light. Its affinity for rayon is only moderate.

Fastusol Turquoise Blue LGLA—(GENERAL)—a direct dyestuff suitable for producing, on cotton or rayon, greenish shades of blue which are said to combine unequalled brilliance and clarity of tone with very good to excellent fastness to light. The product is also suitable for dyeing pure silk and is very desirable for dyeing halfwool and hosiery.

Fastusol Yellow GA Extra—(GENERAL)—a direct color which produces on cotton or on rayon bright shades of a fairly greenish yellow. It is said to possess good fastness to light and can be discharged to a very good white with Rongalite C.

Formanil* Indigo Blue—(AAP)—a new formaldehyde aftertreated direct color, useful as a ground shade on viscose rayon which is to be discharged. This dyestuff produces a neutral shade of Navy and is said to possess very good fastness to washing, good fastness to light and very good fastness to perspiration. Celanese is only slightly stained.

* Registered U. S. Pat. Off.

Formanil* Royal Blue—(AAP)—a formaldehyde aftertreated direct dye which may be considered a companion color to Formanil Indigo Blue inasmuch as it is also recommended as a ground shade on viscose rayon producing Navy Blue shades, redder in tone than the other. It is stated that, as in the case of Formanil Indigo Blue, this color possesses the good all around characteristics found in the entire line of Formanil colors.

* Registered U. S. Pat. Off.

Formanil* Blue 4R—(AAP)—a formaldehyde aftertreated direct color which is even redder in tone than Formanil Royal Blue. This color also possesses all of the attributes found in the line of Formanil colors generally, having particular reference to fastness to washing, light and perspiration as well as possessing very good dischargeability with both neutral and alkaline discharges.

* Registered U. S. Pat. Off.

I

Immedial New Blue FBLA Extra CF—(GENERAL)—a sulfur color which yields exceptionally bright shades of blue. It is recommended by the manufacturers for the dyeing of cotton as well as of rayon in their various forms. It may further be used for the dyeing of goods to be rubberized.

Indanthren Black Brown VA Paste—(GENERAL)—a straight vat color which is recommended by the manufacturers for the dyeing of cotton, rayon and linen in their various forms. It is said to possess very good fastness to light, to washing and to chlorine. It is well adapted also for piece dyeing according to the continuous dyeing method.

Indanthren Blue RD Suprafix—(GENERAL)—a special printing brand of Indanthren Blue BCSA. The product fixes readily, even under varying steaming conditions. It prints bright shades of sky blue said to be characterized by their good fastness to chlorine and outstanding fastness to light. It is well suited for use on curtains, awnings, and other severely exposed materials.

Indanthren Golden Orange 3 GA Extra Paste Fine—(GENERAL)—is a non-drying paste and fixes readily. It produces, on cotton or rayon, prints said to possess excellent fastness to washing, chlorine and to light. While of general interest for printing it is a particularly useful product for the printing of draperies.

Indanthren Grey M3G Paste—(GENERAL)—recommended by the manufacturers for the dyeing of cotton, rayon and linen in their various forms. It is said to possess very good fastness to light, to washing, and to chlorine. It is especially well suited for the dyeing of greys on cotton piece-goods according to the continuous re-reduced padding method, as it does not change its shade in long runs.

Indanthren Printing Black BBA Suprafix Conc.—(GENERAL)—a highly concentrated vat printing black, said to represent a grit-free, non-drying, non-settling paste. It is stated that this product is offered in response to the constantly increasing use of shallow photoengravings on printing rollers. It facilitates the pro-

duction of deep shades of black under these conditions.

K

Katigen Brown W Conc. CF—(GENERAL)—A well known sulfur color which is widely employed in the production of shades ranging from tans to dark browns. It is stated that it is well suited for combination shades and can, due to its greenish tone, be used for dulling shades without imparting an excessively reddish cast.

Katigen Crossdye Green BG-CF—(GENERAL)—a sulfur color which produces fairly bright shades of green. It is valuable both for self shades and for combinations with other sulfur colors. The dyeings are said to possess good fastness to washing and good to very good fastness to light. The product is well suited for machine dyeing and can be used on material which is rubberized after dyeing.

Katigen Deep Black RND Extra Conc. CF and Katigen Deep Black RRND Conc. New CF—(GENERAL)—representing non-dusting forms of the two important red shades of General's sulfur black line. It is stated that they are well suited for the dyeing of cotton and rayon in all stages of manufacture, i.e., raw stock, hanks, packages, beams, and piece goods. They produce full reddish blacks said to be of very good fastness to cross-dyeing, to perspiration, to washing and to light.

Katigen Olive GG-CF—(GENERAL)—a sulfur color said to be of good fastness to washing and very good fastness to light. It is valuable both as a self shade and for combinations with other sulfur colors. It is further said to possess good solubility and good levelling properties and is well adapted for use in the jig and in pressure machines.

Kiton Fast Red 4BLN—(CIBA)—a bluish red wool color said to possess superlative light fastness. Recommended by the manufacturers for piece goods and yarn dyeing where exceptional light fastness and good fastness to washing, perspiration and alkali are required. Cotton, viscose and acetate rayon are reserved.

M

Masul Printing Colors—(McCARTY)—a new line of sulfur printing colors developed exclusively for the printing of rayon. It is stated that the application is simple and economical and the usual vat procedure is employed. They may be printed as self colors or mixed with vats to produce a complete range of shades said to possess good fastness.

Monastral* Fast Blue 2RP Paste—(duPont)—this product is one of the new copper phthalocyanine pigments and is said to be an excellent coloring agent for use in the various printing and dyeing processes ordinarily employing pigment colors. It possesses the fastness properties of other members of the Monastral series and is the reddest member of the group. This pigment is recommended by the manufacturers for use as a self shade and is also used for blending with greener and brighter pigment blues, such as: Monastral Fast Blue BF Paste (Pat.). It is also suitable as a base for deep navy blue shades. The paste is said to embody the necessary physical properties to assure best results. It is finely divided, free from grit and other foreign materials and is easily dispersed in water and oil emulsion media. Moreover, it does not bleed in oil.

* Registered Trade-mark.

Monochrome Black Blue GA—(GENERAL)—a chrome color said to possess many valuable properties. It may be applied by either the afterchrome or monochrome method. It produces shades said to be of very good fastness to light, washing, fulling, water, salt-water, and perspiration.

Monochrome Red FGA Conc.—(GENERAL)—a chrome color said to possess many valuable properties. It may be applied by the afterchrome or the monochrome method, and can also be dyed on a chrome mordant. It produces shades said to be of very good-to-excellent fastness to light and of very good fastness to washing, to fulling, to water, to salt water, and to perspiration.

Monochrome Violet FBA—(GENERAL)—a chrome color recommended by the manufacturers for the production of straight shades of a bright violet and, likewise, as a shading color in combinations with other chrome dyestuffs. The dyeings are said to be distinguished by very good fastness to washing, to fulling, to water, to sea-water, and to perspiration.

N

National Buffalo Black RCW—(NATIONAL)—an acid dye yielding rich, bloomy, blue-black shades on wool fabrics, and said to leave effect threads of cotton, rayon or acetate-rayon remarkably clear.

National Carbanthrene Printing Flavine GCL Paste—(NATIONAL)—a grit-free, non-drying paste said to be of excellent printing value. It yields pure greenish-yellow shades said to possess excellent fastness to washing and perspiration.

National Chromolan Black NWA Conc; National Chromolan Blue NGG; National Chromolan Orange R; National Chromolan Orange GN; National Chromolan Bordeaux R; National Chromolan Yellow NGR—(NATIONAL)—a new group of dyes resembling both the acid and the chrome dyes. They are applied to wool from an acid bath and are said to possess outstanding properties as regards fastness to light, washing, perspiration and salt water.

National Direct Rayon Black KSG—(NATIONAL)—intended principally for coloring rayon, yielding full, bloomy blacks which, even in heavy dyeing, are said to be remarkably free from bronzing. It yields good discharges.

National Erie Black GAC—(NATIONAL)—a direct black leaving acetate rayon effect threads remarkably clear. It is stated that it is particularly adapted for low cost cotton hosiery containing effect threads of this fiber.

National Erie Brilliant Bordeaux 6B—(NATIONAL)—a direct dye yielding very bright bluish red shades. It dissolves readily and levels well. It possesses good affinity for cotton, rayon, pure and tin-weighted silk.

National Erie Brilliant Violet B—(NATIONAL)—a direct violet dye said to be noteworthy for its excellent color value and brilliance of shade. It yields good unions on cotton-silk or cotton-rayon fabrics, acetate rayon effects being left unstained. It discharges to a good white.

National Erie Brilliant Violet R—(NATIONAL)—a companion product to National Erie Brilliant Violet B but redder in shade. It is said to possess good fastness to alkali spotting, mercerizing and sea water.

National Erie Brilliant Yellow 8G—(NATIONAL)—a direct dye producing on cotton or rayon, bright greenish-yellow shades. It is suitable for union dyeing although it stains acetate-rayon effect threads heavily.

National Erie Fast Brown R—(NATIONAL)—a direct dye yielding tobacco-brown shades said to be of excellent fastness to perspiration and rubbing. It leaves acetate rayon effects unstained.

National Fast Acid Yellow 5G Conc.—(NATIONAL)—a greenish-yellow dye which is usually applied to wool in a weakly acid bath although it may also be applied neutral. It is said to possess good fastness to fulling, washing, light and water. It is not suitable for fabrics containing effect threads of cotton, rayon or acetate rayon.

National Solantine Bordeaux 2B—(NATIONAL)—a fast-to-light direct dye

yielding bluish red shades on cotton or rayon. It is well suited for union dyeing leaving acetate effects clear. It is dischargeable with hydrosulfite. It is said to be particularly valuable for coloring drapery materials and the better grades of ladies dress fabrics.

National Solantine Yellow 5GL—(NATIONAL)—a direct yellow said to be of excellent fastness to light, water, stoving and rubbing. It is suitable for coloring cotton-silk or cotton-rayon unions leaving acetate effects unstained. It discharges to a good white.

National Sulfindone Brilliant Blue 6BCFS—(NATIONAL)—a bright sulfur blue said to be of excellent solubility particularly adapted for use in package dyeing machines. It is further said to be of good fastness to light and washing and excellent fastness to perspiration and cross dyeing.

National Sulfur Black 2B Conc.—(NATIONAL)—a sulfur black, intermediate in shade between the red and green shade sulfur blacks and said to possess the same excellent fastness properties.

National Sulfur Black 8GAT—(NATIONAL)—a green shade sulfur black said to be of excellent fastness to perspiration and cross-dyeing. It is further said to be very level dyeing and well suited for application in circulating machines.

National Superchrome Red G—(NATIONAL)—a yellowish red said to be of excellent fastness to light, fulling, washing and perspiration. It can be dyed by all three methods although the maximum fastness is obtained by the top chrome method.

Neolan Bordeaux RM—(CIBA)—this is a new type of the well known Neolan Bordeaux R differing only in the fact that it is slightly bluer and brighter.

Neolan Navy Blue RLG Conc.—(CIBA)—a new addition to the Neolan line. A color said to possess excellent level dyeing properties. It is further said to produce shades of good fastness to sunlight, perspiration, street dirt and salt water. Like other Neolans it is dyed in a fairly strong sulfuric acid bath and consequently eliminates the necessity of neutralizing carbonized pieces.

Neolan Navy Blue 4RL Conc.—(CIBA)—a companion color to Neolan Navy Blue RLG Conc. It has similar dyeing and fastness properties, differing only in the fact that it has a reddish tone.

New Fuchsine—(CALCO)—a basic color, which because of freedom from scum in concentrated solution form, is of special interest for the manufacture of lakes for printing inks. As the red component in formulations for bright maroons and chocolate brown shades, it is recommended by the manufacturers.

Nyagene Brilliant Scarlet GL Extra Conc.—(NYANZA)—a new developed scarlet said to be of excellent fastness to washing, light, acid and cross-dyeing. It yields a white discharge with hydrosulfite. It is stated that due to its good solubility it is suitable for machine dyeing.

Nyagene Fast Green GFL—(NYANZA)—an entirely new developed green and when developed with Developer P Z produces a very bright shade of green said to possess excellent fastness to light and washing.

Nyanza Fast Catechine GA—(NYANZA)—a new direct brown said to possess excellent solubility and fastness to light and washing, leaving acetate rayon unstained.

Nydye Colors—(ALTHOUSE)—a new series of dyes for medium and dark shades on nylon. It is stated that they are readily soluble, do not require any dyeing assistants, and pile on readily. This series comprises a complete range of colors, from yellow to black. They are said to have excellent washing fastness and strip with hydrosulfite.

P

Palatine Fast Blue GGNA-CF—(GENERAL)—an acid dyestuff which is said to possess like all the other Palatine Fast Colors, fastness properties approaching closely those of the chrome colors. It is stated that, due to its very satisfactory level dyeing and fastness properties and its easy method of application, it is well suited for producing fast-to-wearing shades on the better grades of ladies' and men's wear. It can be discharged to a good white with Rongalite C on either a wool or a silk ground.

Palatine Fast Red RNA—(GENERAL)—an acid dyestuff which is said to possess, like the other Palatine Fast Colors, fastness properties closely approaching those of the chrome colors. It is stated that, due to its very satisfactory fastness properties and its easy method of application, it is well suited for producing fast-to-wearing shades on the better grades of ladies' and men's wear.

Palatine Fast Violet 3RNA—(GENERAL)—an acid dyestuff which is said to possess, like all the other Palatine Fast Colors, fastness properties approaching closely those of chrome colors. It is stated that due to its satisfactory level dyeing and fastness properties and to its easy method of application, it is well suited for the dyeing of fast-to-wearing shades on better types of ladies' and men's wear. It can be discharged to a good white and Rongalite C on either a wool or a silk ground.

Para Black CA—(GENERAL)—a direct dyestuff which produces full shades of black when coupled with Nitrazol CF Conc. It is well suited for dyeing cotton or rayon, both piece goods and yarn, and produces shades said to be of moderate to fairly good fastness to washing, of fairly good fastness to water, of good fastness to perspiration and to hot pressing, and of very good fastness to light.

Para Brown RBA Extra Conc.—(GENERAL) — a direct dyestuff which produces full shades of reddish brown when coupled with Nitrazol CF Extra. It is stated that it is well suited for the dyeing of cotton or rayon, both piece-goods and yarn, and produces shades of good fastness to water, to perspiration, to hot-pressing, and to washing. It can be discharged to a good white with Rongalite C.

Para Yellow FRA Conc.—(GENERAL)—a direct dyestuff which produces reddish shades of yellow when coupled with Nitrazol CF Conc. It is well suited for dyeing cotton or rayon, both piece-goods and yarn, and produces shades said to be of fairly good fastness to washing, good fastness to water, and very good fastness to perspiration and to hot pressing.

Para Yellow GA—(GENERAL)—a direct dyestuff which produces fairly bright, greenish shades of yellow when coupled with Nitrazol CF Conc. It is well suited for dyeing either cotton or rayon, both piece-goods and yarn, and produces shades said to be of fairly good fastness to washing, to water and to perspiration.

Phenacyl* Printing Yellow A—(PHOENIX)—a reddish shade of yellow, recommended by the manufacturers for direct acetate printing. It is stated that it is readily soluble, fast to sublimation, gas fading, washing, light, acid and alkali; does not crock, levels off and penetrates exceptionally well. Phenacyl Printing Yellow A will be found useful for producing heavy green, tan and gold shades.

* Reg. U. S. Pat. Off.

Phenacyl* Yellow R—(PHOENIX)—an economical reddish shade of yellow and said to be very useful in producing heavy green, tan and gold shades. It is further said to level off and penetrate very well and to be suitable for either jig or box dyeing. It will not stain cotton or rayon and is suitable for dyeing mixed fabrics. It is stated that Phenacyl Yellow R is fast to washing, light, acid, alkali, nitrous acid

and the regular developing with B.O.N. It is free from crocking and phototropism.

* Reg. U. S. Pat. Off.

Phenaldehyde* Black GR 200%—(PHOENIX)—a direct dyestuff said to be rendered extremely fast to washing by aftertreatment with formaldehyde. It is recommended by the manufacturers for dyeing cotton, and particularly rayon. In addition to its wash fastness, Phenaldehyde Black GR 200 per cent discharges to a pure white and is said to be fast to hot ironing, acid and alkali. A full bloomy black is obtained which does not bronze in heavy shades.

* Reg. U. S. Pat. Off.

Phenamine Black BD Extra—(GENERAL)—a direct dyestuff well suited for the production of greenish blacks on cotton, rayon and on other vegetable fibers. It is said to possess the advantage of slightly better dischargeability over the ordinary direct deep blacks.

Phenamine Blue Black BCW—(GENERAL)—a direct color which produces deep blue black shades on cotton and rayon. The outstanding feature of this product, is said to be that in the dyeing of mixed fibers, acetate rayon is left practically unstained.

Polyform* Blue RF (P.A.F.)—(duPONT)—a formaldehyde-aftertreated direct color that is of particular interest as a ground shade on viscose-process rayon which is to be subsequently discharged. It is slightly greener in shade than Polyform Blhe 2RF (P.A.F.) and therefore better suited to the production of navies. When dyed on rayon it is said to show very good fastness to washing at 160°F., light, perspiration and pressing.

* Registered Trade-mark.

Polyform* Bordeaux RF—(duPONT)—Polyform Bordeaux RF is a formaldehyde-aftertreated direct color which is of special interest as a ground shade for colored discharge work both on viscose-process rayon and cotton. It yields a deep bluish shade of red which is somewhat duller than that of Pontamine Diazo Bordeaux RB, but its light fastness is slightly superior to that of the developed color. Rayon dyeings of Polyform Bordeaux RF are said to show excellent fastness to washing and perspiration, while dyeings on cotton show slightly inferior resistance.

* Registered Trade-mark.

Pontachrome* Fast Yellow R Conc.—(du PONT)—the latest addition to the range of Du Pont chrome colors. It is identical with Pontachrome Fast Yellow R in fastness properties but is two and one-half times as strong as the older type. It is of particular interest for men's overcoatings and suitings, and for the production of Government olive drab shades, khaki, tan and browns in conjunction with other colors having similar properties. It is said to show good general fastness, being practically unaffected by light, ammonia, fulling, perspiration, hot pressing and laundering. It may be applied to wool rawstock, tops or yarn by the top chrome, chromate and bottom chrome methods, but maximum fastness to wet processing is obtained with the top chrome dyeings. It may be dyed in any of the equipment generally employed for chrome colors as well as in open kettles.

* Registered Trade-mark.

Pontamine* Black BCN—(duPONT)—a direct color which is similar in general characteristics to Du Pont Seristan Black B Double 200 per cent but slightly brighter in shade, and stains acetate rayon somewhat less. Its fastness to light and perspiration is said to be good while its resistance to washing is moderate. This dyestuff is recommended by the manufacturers for use on cotton materials containing acetate effect threads which need not be pure white. This fiber takes a slight silvery stain that is not considered objectionable. Pontamine Black BCN is not suitable for use in circulating type dyeing machines.

* Registered Trade-mark.

R

Rapidogen Brown GN—(GENERAL)—is dissolved, printed and developed in the usual manner for Rapidogens. On fabrics of cotton or rayon, it produces neutral browns said to be of good fastness to soaping and chlorine, but it is only moderately fast to light.

Rapidogen Golden Yellow 3R—(GENERAL)—a new addition to the line of Rapidogen Colors. On cotton or rayon, it produces bright, golden yellow shades with a reddish cast which cannot be duplicated with mixtures of other Rapidogen types. It yields printing pastes said to possess very good stability and excellent fastness to washing, fairly good fastness to chlorine and moderate fastness to light.

Rapidogen Navy Blue FFR—(GENERAL)—a valuable addition to the line of Rapidogens. It produces particularly fine navies, brighter and redder than those obtainable with present brands, such as Rapidogen Blue N. It is said to show good stability and dissolve readily without the addition of solvents.

Rapidogen Orange FFR—(GENERAL)—produces bright, reddish shades of orange said to be of good fastness to washing and to chlorine and of very good fastness to light. Like other "FF" brands, it shows a high speed of coupling, being completely developed by a short acid ageing.

Rapidogen Red FFBB—(GENERAL)—produces bright, bluish shades of red said to possess very good fastness to washing and to chlorine. Like other "FF" brands, it shows a high speed of coupling, being completely developed by a short acid ageing.

Rapidogen Red FFG—(GENERAL)—produces bright shades of red said to be of good fastness to light and of very good fastness to washing and to chlorine. Like other "FF" brands, it shows a high speed of coupling, being completely developed by a short acid ageing.

Rapidogen Red FFR—(GENERAL)—produces in printing bright shades of red said to be of very good fastness to washing, to chlorine, and to hot pressing. Like the other "FF" brands, it shows a high speed of coupling, being completely developed by a short acid ageing.

Rapidogen Scarlet FFG—(GENERAL)—produces bright, yellowish shades of scarlet said to be of good fastness to chlorine and of very good fastness to washing and to light. Like other "FF" brands, it shows a high speed of coupling, being completely developed by a short acid ageing.

Rapidogen Scarlet FFR—(GENERAL)—produces bright, yellowish shades of red said to be of very good fastness to light, to washing, and to chlorine. Like other "FF" types, it shows a high speed of coupling, being completely developed by a short acid ageing.

Rapidogen Yellow FFGG—(GENERAL)—produces bright, greenish shades of yellow said to possess good to very good fastness to light and to chlorine and very good fastness to washing. Like other "FF" brands, it shows a high speed of coupling being completely developed by a short acid ageing. It is not suitable for printing on a Lactic Acid Prepare or for printing with Developer RNA.

S

Sandothrene Brown G Double Paste—(SANDOZ)—a vat dyestuff of reddish shade, said to be particularly adaptable to printing on both cotton and rayon.

Sol-Aqua-Fast Red RL — (ALTHOUSE)—one of a new series of direct dyes said to have superior light and washing fastness to the direct colors. It is stated that it has equivalent light fastness to the usual light fast direct dyes. The washing fastness complies with the commercial requirements.

Solophenyl Brown RL—(GEIGY)—a homogeneous direct dyeing brown said to be outstanding for its exceptionally good resistance to light and for its very good

fastness to washing (with or without an aftertreatment of Formaldehyde), especially when applied to viscose rayon materials. It is stated that it has good exhaustive properties, even at temperatures as low as 160° F., and may easily be used in combination with other Solophenyl colors to obtain a variety of shades with excellent resistance to light. This unique reddish shade of brown will come into consideration especially for light shades, for the dyeing of draperies, automobile and upholstery fabrics or wherever extreme fastness to light is desired.

Solophenyl Grey 4 GL—(GEIGY)—a homogeneous direct dyeing grey said to possess exceptionally good resistance to light. It produces a true grey shade and should prove interesting as a self shade or in combination with other Solophenyl colors for producing fast to light mode shades. It is stated that it has unusual fastness to washing with or without aftertreatment with Formaldehyde.

SRA* Blue B Printing Paste—(AAP)—a new development in SRA printing colors for Celanese and acetate fabrics. Printed directly onto the fabric by means of standard textile printing equipment. This color is said to possess excellent tinctorial value and prints smoothly and sharply in light and heavy shades. It is non-subliming, runs well and is easily handled by both machine and screen printers.

* Registered U. S. Pat. Off.

SRA* Green Blue Printing Paste—(AAP)—as the name implies, this product is of special interest for printing directly on Celanese and acetate fabrics. It is stated that tinctorial power is very good and the color gives smooth, sharp prints whether run in machine or screen prints. It is said to possess good all-around fastness properties and of particular importance is its fastness to sublimation.

* Registered U. S. Pat. Off.

SRA* Pink 3B—(AAP)—it is stated that the fact that this color is branded with the SRA trade-mark means that its all-around good fastness properties, etc., entitles it to inclusion in this group. It is claimed that pick-up and pile-on are excellent, light fastness excellent and washing good. It is not dischargeable. It is recommended by the manufacturers for producing light bluish pink and rose or rhodamine shades on bright and dull Celanese and acetate constructions, working equally well on box or gig.

* Registered U. S. Pat. Off.

SRA* Red Y—(AAP)—a yellowish red of intermediate brightness. **SRA* Red 2B**—(AAP)—a bluish red of good brightness. These new companion colors, readily dispersible, quick dyeing types of good affinity are recommended by the manufacturers for pink, red and Bordeaux shades of Celanese and acetate rayons and because of the excellent dischargeability and fastness to sublimation claimed for them should be of particular interest for discharge printing. Fastness to light, washing, and perspiration are said to be very good.

* Registered U. S. Pat. Off.

SRA* Yellow 3R—(AAP)—a reddish yellow recommended by the manufacturers for the dyeing of Celanese and acetate rayon. This new product is said to possess good fastness to light and washing and very good to perspiration. Fastness to acid fading is said to be very good. It is stated that it has very good solubility, excellent affinity and dispersion, discharges an excellent white and is excellent to sublimation. It should also be of interest to nylon hosiery as it strips down well with hydrosulfite.

* Registered U. S. Pat. Off.

Sulfogene* Golden Brown 2RCF—(du PONT)—a sulfur color whose copper content has been carefully controlled during manufacture so that it may be safely applied to cotton goods that are to be subsequently rubberized. The direct dyeings are said to be very resistant to acids, pressing, fulling, steaming and water spotting. They also are said to show good fastness to ammonia, mercerizing, perspiration, crocking and washing. When aftertreated the fastness is further improved. It can be applied to cotton rawstock, yarn or piece-goods and in all types of machines. Sulfogene Golden Brown 2RCF can be used alone or in combinations, especially on tightly woven goods such as jeans, drills and corduroys which have to withstand hard wear.

* Registered Trade-mark.

Sulphon Yellow RS Extra—(GENERAL)—an acid yellow, producing fairly bright shades. The dyeings are said to possess fairly good to good, fastness to light, good fastness to washing and to perspiration, and good to very good fastness to fresh and sea water. The manufacturers recommend it primarily for the dyeing of knitting yarns for sweaters and bathing suits and also of loose wool for blankets . . . The product can be supplied in a quality suitable for goods which are rubberized after dyeing.

Superlitefast Red GL — (ALTHOUSE)—claimed to be an extremely light fast direct color, superior in dyeing properties and exhaustion to the previous offering of Superlitefast Red 3BL. It is said to comply with the maximum requirements for light fast fabrics, and to be excellent for open and closed type dyeing machines.

Supramine Red BBLA—(GENERAL)—an acid color representing a valuable addition to the Supramines. It is suitable for application on the various forms of wool. It is particularly recommended by the manufacturers for the dyeing of knitting and hosiery yarns, and of articles which must possess good fastness to washing and, at the same time, good fastness to light.

T

Thional Brilliant Blue GBCF—(SANDOZ)—a sulfur color said to be very bright in shade. It is stated that this color dyes very level, develops easily, and does not require a long oxidizing treatment; also does not bronze easily.

V

Vat Khaki OG—(PEERLESS)—an olive green shade said to possess excellent fastness to practically everything except chlorine bleach. It is suitable for tarpaulins, rubberized goods, belts, tent cloth, gaiter cloth and all other purposes where a fast vat dye is needed and which are not subject to bleaching with chlorine. It is said to be very fast to light on cotton, rayon and silk. Vat Khaki OG is further said to be an excellent vat for silk thread. The makers will gladly supply dyeing formula.

Vat Printing Black A Paste New—(CIBA)—an economical vat printing color especially developed for printing on pigment, filament and spun rayon. It is said to disperse readily in varied types of printing gums and make a staple print paste. This new type reduces and reoxidizes readily and gives a full bloomy black.

Viscose Navy Blue D—(GENERAL)—a direct dyestuff suitable for producing navy blue shades on cotton and, in particular, on rayon. The dyeings can be discharged to a good white with Rongalite C.

Vitrolan Black WA; Vitrolan Blue 2G; Vitrolan Bordeaux R; Vitrolan Orange R — (SANDOZ) — chromiferous dyestuffs with all the usual fastness properties pertaining to this type of dyestuff.

W

Wool Fast Orange GA—(GENERAL)—a product suited for the dyeing of wool, either as an acid color or as a chrome color. It is stated that it is widely used as the orange component in chrome color combinations on loose wool, slubbing, yarns, and piece goods for the production of fast to wearing and fast to processing shades, in particular, for olives and browns.

X

Xylene Light Yellow N2G—(SANDOZ)—a new type of fast to light yellow which, in general properties, is comparable to Xylene Light Yellow 3G, but somewhat faster to alkali as well as having better affinity to wool and mohair dyed in a neutral bath.

TEXTILE CHEMICALS

A

Activol — (BURK-SCHIER) — an alkyl aryl sulfonate said to possess excellent wetting properties and good detergency.

Aero Brand Finishing Oil No. 774—(CYANAMID) — recommended by the manufacturers as a finishing oil for Terry towels. When finished with this oil, the towels are said to be left in a soft and highly absorbent state.

Aero Brand Finishing Oil No. 784—(CYANAMID) — recommended by the manufacturers as a rewetting agent on cottons and rayons. This oil is added to finishing baths prior to Sanforizing. This oil is said to impart softness as well as absorbency to the goods.

Aerotex 140—(CALCO)—a viscose synthetic resin emulsion for use in the backfilling and weighting of the lower count cotton constructions. Aerotex 140 in combination with starches, dextrines, or gums is said to produce very satisfactory results in the backsizing of carpets.

Aerotex No. 140—(CYANAMID)—recommended by the manufacturers as a binder in backfilling mixes. It is also recommended as a binder in warp sizing mixtures for cottons and rayons to reduce shedding and stoppage on the loom.

Aerotex 301—(CALCO)—an emulsion blend of synthetic resins used principally in the finishing of spun rayon and spun rayon mixed fabrics. It can be applied by any of the usual methods used in the finishing of spun rayons; e. g. pad mangle and batch, quetsch and batch, pad mangle and dry, quetsch and dry, etc.

Ahco Woolen Oil F—(ARNOLD-HOFFMAN)—a self-emulsifying lubricant for use on woolens giving a stable emulsion in water. The product is said to be easily removed from cloth on scouring and to be stable to oxidation and rancidity.

Ahco Woolen Oil G—(ARNOLD-HOFFMAN) — a non-soluble lubricant which the woolen manufacturers may use as an emulsion by the addition of alkali. It is stable to oxidation and rancidity and is said to be easily removed from the fabric on scouring.

Ahco Worsted Oil N—(ARNOLD-HOFFMAN)—a non-soluble worsted lubricant which may be emulsified by the manufacturer by the addition of small amounts of alkali. The oil is said to be stable to oxidation and rancidity.

Ahco Worsted Oil PBS—(ARNOLD-HOFFMAN)—a self-emulsifying worsted oil containing the standard mineral oil recommended for wool commission mills with a domestic emulsifier. This oil is said to have all the stability of olive oil with respect to oxidation, scouring and level dyeing.

Ahco Worsted Oil PC-1—(ARNOLD-HOFFMAN)—a standard mineral-cocoanut oil blend for commission wool manufacturers. The mineral oil constituent is selected for its stability to oxidation and acid development.

Ahcoprint G and E—(ARNOLD-HOFFMAN) — pigment printing bases which are said to directly emulsify with water to very heavy pastes in which pigments disperse readily. It is stated that emulsions are directly miscible in water, easily cleaned off machines and free of action on rubber or metal parts. Emulsions will not break down on long continuous runs. After prints are dried on dry cans, no baking is necessary. They are said to be completely wash resistant and have soft, unstiffened handles.

Alkamine — (AMALGAMATED) — a detergent which, it is claimed, possesses all the important properties of soap, sulfonated oils and sulfonated fatty alcohols plus increased wetting ability, stability to hard water and stability to lime salts, magnesium salts, iron, organic or mineral acids. When added to the dyebath, dye penetration is said to be increased and dyeing time shortened. It is available in two forms: Alkamine SF in paste form for scouring and Alkamine AN in liquid form for wetting-out.

Alkapen AA — (BURK-SCHIER) — wetting agent for dry mercerizing; a caustic penetrant said to represent the latest advance in this type of mercerizing assistant.

Amyl-Trag — (NATIONAL STARCH) — recommended for textile printing and finishing, in place of gum tragacanth, locust bean gum, etc. This thickener is said to produce a heavy-bodied, smooth paste, with good flow properties which is ideal for applications of all types of colors, in textile printing and also suitable for finishing cotton and rayon fabrics.

Ankord — (AQUA-SEC) — an alkali soluble cellulose ether, said to produce a permanent finish on cottons and rayons. It is stated that its application on greige goods or during mercerization tends to stabilize fibers. Any type hand obtainable. Also basis for permanent back filled finish.

Anti-Fume Finish No. 24—(SANDOZ)—an improved inhibitor for acetate rayon goods which is said to render these materials resistant to gas fading. The material is further said to produce a soft hand of good draping qualities and the desired effect can be produced by a very simple aftertreatment.

A.P.C. (Anhydrous Phenol Compound) (PAISLEY)—a preservative and penetrant said to possess high detergent power which may be used in any type solution in all departments of textile manufacturing.

Appramine* 967 — (WARWICK—a cationic softener for use on all types of cotton and rayon fabrics. It is said to be readily soluble in water at all temperatures above 30°C.

* Registered Trade-mark.

Aripel — (ARKANSAS) — an anti-fume agent offered for finishing dyed acetate rayon fabrics to increase their resistance to gas fading. It is supplied in a type that combines finishing as well as anti-gas fading properties and is said to produce a complete finish on the fabric without the use of any other softeners or finishing agents. Another type merely supplies the anti-gas fading properties and may be used in conjunction with softeners and other finishes to obtain the required finish.

Aquadye Printing Paste—(ARIDYE) —an organic printing emulsion for use with standard soluble dyes. It is claimed that this paste gives a sounder mark and prints sharply from shallower engravings. It is said to eliminate the necessity of washing the goods after ageing and reduce the tendency to staining of white grounds.

Aqua-Perm F 65—(AQUA-SEC)—a urea formaldehyde condensate said to possess unusual properties. It is stated that it produces maximum crease proofing, shrinkage control and stabilization of fibers having superior wash fastness.

Aqua-Perm S. F. Special—(AQUA-SEC)—a proteinaceous resin condensate for application on spun rayon fabrics and said to produce a full bodied but drapy hand. It is claimed to reduce shrinkage and slippage and to have excellent wash fastness.

Aqua-Sec No. 15—(AQUA-SEC)—a stable one bath water repellent compound for application to satins, taffetas and other fabrics where retention of luster and softness of hand is desirable.

Aqua-Sec No. 90—(AQUA-SEC)—a specially compounded water repellent, intended for use on rayons, wool and blends

to produce maximum water resistance as well as developing a full drapy round hand.

Aqua-Sec No. 104—(AQUA-SEC)—a stable water repellent compound for use with starches, gums, dextrines and other bodying agents. May be applied at high temperatures. It is said to be excellent for laundry use. It is stated that it will meet all standard specifications for water repellent.

Aqua-Tergent — (AQUA-SEC) — a blend of sulfated fatty acid and phosphate ester. It is claimed to be a potent detergent, penetrating, and emulsifying agent which is stable under all acid and alkaline conditions.

B

Burmol Extra—(GENERAL)—is a novel bleaching and cleansing agent. Its outstanding property is said to be the ability to reduce and dissolve iron compounds in an alkaline or neutral solution. It is a white powder of good solubility; its aqueous solutions react weakly alkaline and are stable for some time.

C

Chenol Concentrate — (BURK-SCHIER—a synthetic organic detergent and washing agent especially developed for the processing of chenille textiles, but said to possess properties desirable for many phases of wet-processing.

Colotex-B—(NEUBERG)—a universal textile indicator. It is manufactured by General Chemical Manufacturing Co. and distributed by Neuberg. The product is said to be quick and economical to use. It is supplied in one ounce bottles ready for use, and may be used over and over until the liquid is exhausted. Each test requires approximately five minutes.

Comco Binder 1135 — (COMMONWEALTH)—a tacky binder for starch sizing and back filling which is said to prevent dusting and harshness. It is further said to render fabrics tougher and more flexible, reduces shrinkage.

Comco Size 1129 — (COMMONWEALTH)—an economical size, in powder form, for slashing acetate yarns. It is said to possess excellent binding power and penetration and to be easily scoured out.

Compound 743 DS — (BURK-SCHIER)—a concentrate liquid organic scrooping agent.

Culofix—(ARKANSAS)—Culofix is a softening and finishing agent said to possess the property of increasing the fastness to water of direct or substantive dyeings on textile fabrics. It is used dissolved in the last rinse after dyeing to prevent bleeding in water and is especially suitable for finishing prints to prevent color bleed during processing.

CWS Printing Gum—(NATIONAL STARCH)—a new cold water swelling thickening agent, requiring no cooking, particularly recommended by the manufacturers for machine and screen printing of vat colors, Rapidogen colors, Indigosols, Pharmasols, chrome, basic colors, etc. It is also particularly recommended for vat and discharge printing on rayon and acetate fabrics where good penetration and rinsability are required. This same thickener is also said to be very desirable for peroxide padding in the printing operation in order to minimize doctor streaks and to produce sharper prints made with vat or discharge colors.

Cyclopon A—(GENERAL)—is a novel scouring agent said to possess excellent stability to hard water, acids and alkali. It can be offered for all scouring purposes for animal or vegetable fibers, wherever economy is desired. As a scouring agent, it resembles Igepon T and only lacks its versatility as an emulsifying, wetting and dyeing assistant.

D

Deceresol FRW No. 1—(CYANAMID)—this is a paste type product recommended by the manufacturers for impregnation into cotton and rayon goods prior to dyeing. It is said to facilitate the penetration of the dyestuffs. This product is also recommended for use on Terry towels to impart a very soft finish and a high degree of absorbency.

Dypenol K—(HART)—a new mercerizing penetrant which is said to be especially suited for caustic concentration above 60° Tw. Dypenol K is also recommended by the manufacturers because of its nonfoaming properties as a mercerizing penetrant where the caustic is recovered under high vacuum. It is stated that Dypenol K will eliminate all boiling out or wetting out of yarns or fabrics prior to mercerizing and will insure complete mercerization in minimum time.

Dypyne No. 289—(PAISLEY)—a synthetic pine oil for textile dyeing of yarn or fabric which is said to produce brilliant and level shades while reducing surface tension to insure even distribution of dyestuffs.

E

Emulgor A—(GLYCO)—an emulsifying agent recommended by the manufacturers for the manufacture of emulsions stable in the presence of aluminum sulfate, sulfuric acid and other salts, acids and electrolytes.

Eutinol — (WOLF) — a concentrated fluid that simplifies print washing. Eutinol is said to have rapid wetting, maximum deterging and softening properties. It can be used on all fibers and is said to produce brighter, more lustrous colors and softer fabrics.

F

Fastogene* — (AAP) — said to render direct colors on cotton, rayon, jute, etc., fast to water. The dyed material after dyeing is rinsed and aftertreated with 3% Fastogene in a lukewarm bath for half an hour. This application is very easy to process and yields dyeings said to be of exceptional fastness to water.

* Registered U. S. Pat. Off.

Fiberjel SR — (NATIONAL STARCH)—recommended by the manufacturers for warp sizing of spun rayon warp yarns. Also recommended for yarns containing spun rayon, cotton, acetate and wool.

Fiberjel V — (NATIONAL STARCH)—a new one-piece warp size for filament viscose yarns.

Fibertex — (NATIONAL STARCH) —a new series of finishing gums, which are said to gelatinize into transparent solutions, and to have excellent stability. Recommended by the manufacturers for the finishing of fine goods fabrics such as lawns, organdies, dimities, and other sheer fabrics.

Finish 600 Paste—(CIBA)—a cation active softener, light in color.

Finish 603 Powder—(CIBA)—a cationic softener similar to Finish 600 but with only slight effect on the shade or light fastness of colors, and with good fixative properties.

Finish NST—(SANDOZ)—an improved finish for cotton and rayon fabrics, spun rayon and filament rayon, also mixtures of cotton and rayon, which is said to produce a full body combined with extra weight and draping qualities.

Finish O-2—(STANDARD)—used as a permanent finish on spun rayon, rayon, and spun rayon mixed with cotton, acetate and wool, being applied in the quetsch, pad or sizing machine and dried at ordinary dryer temperatures. No after-treatment is necessary. It is said to give the cloth a permanent finish and make it slip-proof.

Flameproofing Agent 313—(GLYCO) —for the flameproofing of textiles, paper and other porous and fibrous materials. Flameproofing Agent 313 is a white crystalline solid which is particularly recommended by the manufacturers for flameproofing of cotton goods, paper, etc., where

the elimination of after-glow is an important factor. It is stated that materials treated with Flameproofing Agent 313 do not dust off; that flameproofing Agent 313 is non-hygroscopic so that materials treated with it do not become damp or sticky in humid weather, nor harsh and brittle in dry weather and that it does not cause any deterioration or reduction of tensile strength.

Flexal No. 245—(HART)—a solution of a new thermoplastic resin similar to Flexal N-800. It is especially recommended by the manufacturers as a finish where increase of fullness of hand and weight is desired in a fabric without increasing stiffness. The product is readily soluble in water and may be used with starches, soluble oils and wax emulsions. No curing treatment is required.

Flexal N-800—(HART)—a solution of a new thermoplastic resin. This product may be used alone or in conjunction with soluble oils, waxes or starches for the finishing of all types of fabrics. When used as a straight finish it is said to impart fullness of hand and stiffness to the fabric. When used with starches it is said to add flexibility and toughness to the finish. No baking, curing or acid treatment is required in applying Flexal N-800.

Formaset* 20 — (WARWICK) — a partially polymerized U-F resin being used for durable finishes on all types of cotton and rayon fabrics which is said to produce body and fullness and impart shrink-setting properties.

* Registered Trade-mark.

Formaset* 60 — (WARWICK) — an alkyd resin designed for use in finishing of cotton and rayon fabrics.

* Registered Trade-mark.

H

Hydrocide GK—(ROHM & HAAS)—a new bactericide and fungicide said to possess many unusual properties for textile application. It is a cation active material of particular interest as a mildew proofing agent. It is odorless and preliminary tests are said to indicate that it is not irritating to the skin.

Hydropel A D — (COMMONWEALTH)—a waterproofing compound especially developed for Army fabrics. It is said to pass the government penetration test.

I

Igepon T Gel—(GENERAL)—is an auxiliary which has been adopted for a great variety of uses. It is stated that it has become popular largely on account of its superior physical form, representing a clear, amber-colored, thin jelly. It is said to possess all the good properties of soap, without its drawbacks and its action to be more effective. It therefore is claimed to replace soap to advantage even under circumstances favorable to soap, while it gives excellent results even in hard water and under difficult working conditions.

Impregnole* 936—(WARWICK)—an addition to the line of Impregnole water repellent finishes which have been identified on the market under the Weather-Sealed label. It is said to readily disperse in water at low temperatures and produce an exceptional soft finish.

* Registered Trade-mark and Patented.

Impregnole* PW—(WARWICK)—an addition to the line of Impregnole water repellent finishes which have been identified on the market under the Weather-Sealed label. This product is designed for use on woolen fabrics and is said to possess exceptional good exhaustion properties.

* Registered Trade-mark and Patented.

Imularv—(ONYX)—this new Onyx durable moth proofing agent is quite similar in its principal features to Larv-O-Nil but differs in its application to the fabric. Imularv is applied in the dye bath and is said to be resistant to conventional washings.

K

Katanol WB Conc.—(GENERAL)—a new auxiliary for the dyeing of union fabrics. It is a reserving agent for the animal fibers. It is said to combine good reserving action with excellent penetrating properties which makes it particularly adapted for the dyeing of union fabrics which are tightly woven or where the cotton or rayon are tightly twisted and where the animal fiber is to be left clean or dyed a contrasting shade.

Kem Oils AO and A-40—(KEM)—soluble oils for softening, finishing and Sanforizing, made by a novel process. It is stated that they contain no sulfonated oils, no sulfonates, no mineral oils, no fish or marine animal oils but pure vegetable oils only. Very light color, clear and fluid, virtually odorless. Made in different concentrations and modifications. It is claimed that they possess certain advantages over sulfonated oils without additional cost and can be used in place of oils now scarce. They are said to have excellent emulsifying and wetting properties. Special grades available for manufacture of soluble pine oils.

Kemulsion Base AA — (KEM)—an emulsion base suitable for blending with essential oils and aromatics to make them self-emulsifying in water. It is stated that this base is almost colorless, practically neutral and odorless, low in cost, a clear liquid of oily consistency. Recommended by the manufacturers for preparation of soluble pine oils for textile processing. Forms a brilliant liquid mixture with pine oil by simple hand-stirring at room temperature, which then dissolves or emulsifies spontaneously in water to form clear or colloidal solutions, according to proportions used.

Kierpyne No. 350—(PAISLEY)—a synthetic pine oil for kier-boil-off of cotton goods said to possess higher emulsive and detergent power than found in normal pine oil.

L

Lamepon* A—(CHEMICAL)—a textile processing agent based on protein: fatty-acid condensate which is said to have pronounced emulsifying, dispersing, leveling and rinsing properties. It is a surface-active agent which is said to have high stability in alkali and heat and is used in scouring, bleaching and dyeing of all types of textile fibers.

* Registered Trade-mark.

Lanamyl—(NATIONAL STARCH)—a new domestic starch product for the warp sizing of worsted yarns which is said to possess desirable slow congealing and strong film forming properties.

Lanitol S—(ARKANSAS)—Lanitol S is claimed to be a highly efficient scouring agent and detergent having a mild action and is offered for use in connection with boiling off and scouring rayon fabrics. It is said to be particularly valuable for processing and scouring hosiery made from various types of rayon containing substantial quantities of knitting oil. It is stated that it quickly loosens and removes all oil and dirt from the rayon hose with a minimum of mechanical effort and therefore the hose is placed in perfect condition for the subsequent dyeing and finishing operation without the usual damaged yarn or broken filaments caused by the abrasive action of long scouring processes.

Larv-O-Nil—(ONYX)—a new moth proofing agent for making woolens and animal fibers immune to the ravages of the larvae of the clothes moth, carpet beetle and allied insects. It is applied directly after the dye bath. Larv-O-Nil is said to be particularly resistant to dry cleanings.

Leonil SA—(GENERAL)—is a levelling and penetrating agent for acid dyeing of wool and a wetting agent for carbonizing. It is a tan powder, readily soluble in warm water. It can be kept in stable stock solutions of 10-15 per cent concentration if desired. It is stated that the product is not susceptible to lime, in fact,

it will alleviate the injurious effects caused by lime soaps.

Lighting Penetrator 1151 — (COMMONWEALTH)—a new water and oil soluble wetting agent for all fibers said to possess fast wetting time, cold and hot. Used in 1/100 to 1/10 per cent solutions. Effective in slightly acid, neutral or slightly alkaline bath.

Lupomin Q—(WOLF)—a cation active finish recommended by the manufacturers for softening cotton, silk, rayon and acetate fabrics. Used in alkaline, acid or neutral solutions, it is said to give a very soft and full finish to piece goods.

M

Mellostrine W B—(NYANZA) — a newly designed finish for rayon hosiery said to possess exceptional delustering properties on high luster rayon. It is also said to impart splash proof, body, and snag resistance to the hosiery.

Mercerizers Softener SM—(BURK-SCHIER)—especially suited for softening and finishing mercerized cotton yarn. Greatly improves knitting qualities.

Methacrol* BE—(duPONT)—a stiffening and bodying agent that is compatible with polyvalent metal ions and with catonic surface active agents. It is, therefore, adapted to use in finishing operations where these materials are present in high concentrations. Methacrol BE is substantive to wool, silk, cotton, nylon, viscose process rayon and cellulose acetate rayon. It can be applied from a dilute bath by exhaustion. The substantive property makes it particularly suitable for use on knit goods and fabrics that cannot be handled on a padder or quetsch. It is stated that, when used with the durable water repellent, Zelan† A, in a combination bath, it modifies the soft hand produced by the Zelan.

* Trade-mark.
† Registered Trade-mark.

Methacrol* NH—(duPONT)— a finish for nylon hose which is said to impart snag-resistance and a delustering finish. Methacrol NH is a stable milk-white fluid dispersion that is compatible with metallic ions, but not with soaps or other soaplike surface active agents. The Methacrol NH finish adds body to the stockings to permit satisfactory packaging. The finish is said to be durable to washing.

* Trade-mark.

Methacrol* SH—(duPONT)—recommended by the manufacturers for use either alone or in combination with the water repellent Aridex† WR and/or Aridex WP (Pat.) on silk hosiery. It is said to have a very strong delustering effect on the fiber, being more active in this respect than Methacrol NH. When Methacrol SH is used with starch (or gelatin) and Aridex, excellent water repellancy and a good body are said to be obtained. By varying the percentages of these materials, almost any desired hand can be produced.

* Trade-mark.
† Registered Trade-mark.

Modinal D—(P & G)—a wetting agent, detergent, emulsifying agent and dyeing assistant. It is a long chain alcohol sulfate.

N

Nekal NS—(GENERAL)—is an entirely new type of wetting agent. It comes in the form of a clear amber colored liquid which is miscible with water in any proportion. It was developed specifically for instantaneous wetting even in a cold bath. It is stated that a very valuable and special feature of Nekal NS is its ability to rewet. When dried into the fiber from a water solution, it is said to impart to the material the property of immediate absorption. This unusual property should be of particular value in the preliminary treatment of material before printing or dyeing.

Nipocer—(GLYCO)—a domestic synthetic wax intended to replace Japan Wax for all operations in the textile industry. Nipocer can be used directly in place of Japan Wax, both in the straight form and in the emulsion form.

Nopco 2031—(NOPCO)—a new type of dyeing penetrant. It is said to work very well in hard water and to leave the cotton or wool goods nice and soft. Nopco 2031 will stand large amounts of salts and will remain stable in strong acid solutions.

Nopco 2105 C—(NOPCO)—a new synthetic softener especially designed for the finishing and softening of rayon, acetate, and knitted fabrics. It is also adaptable for use as a pure finish for broadcloth.

Nopco 2268-C—(NOPCO)—used in scouring rayon, dyeing rayon, or rayon mixtures. Can be used for scouring cotton, rayon hosiery.

Nyanza Rayon Finish M—(NYANZA)—a synthetic finish for rendering cotton, linen, rayon, acetate and wool, and rayon and carpet wool materials crush-resistant at normal drying temperatures.

Nyanza Rayon Hosiery Finish M—(NYANZA)—a finish for synthetic hosiery said to impart the feel and appearance of real silk. It is said to improve the snag and run resistance of rayon hosiery and to be an excellent basis for binding the other finishing components.

Nylon Coning Oil L.T.; 85; 125—(STANDARD)—these three oils are made in different viscosities, especially adaptable for the coning operation of nylon. They are said to give excellent coning, no drag or friction in operation, softer cone, pliable yarn, and on the knitting machine, even stitch formation, and no gumming or rusting of the needles. These three products were specially made for nylon, the difference being in the viscosity, making the oils adaptable for all types of machines.

P

Paramine—(ARKANSAS)—Paramine is claimed to be a powerful softener and highly efficient finishing agent and is offered for use in processing all types of textile fibers to produce greater softness and a generally improved and pleasing finish. It is cation active and may be applied in the usual mill equipment. It is said to be particularly valuable for finishing cotton, silk, viscose and acetate fabrics including spun rayons. When used dissolved in the last rinse for finishing woolen fabrics, it is said to impart a soft, smooth, full feeling hand and eliminate the harshness produced in the normal processing of same.

Penetra-Set "C" Extra—(PAISLEY)—a synthetic resin said to combine highest penetrative power, setting of twist and as a binder to insure even sizing for throwing Bemberg and other rayons.

Penetra-Set T-X-A—(PAISLEY)—for wet-twisting of cotton thread. It is said to eliminate black accumulations on metal rolls caused by vegetable and mineral substances inherent in water.

Penetra-Set "W W"—(PAISLEY)—a spray for conditioning hard twist worsted filling precluding kinks and assisting in scouring and finishing.

Permalon—(HART) (Patents applied for)—a new permanent cellulosic finish for cotton, rayons and mixtures. It is used to impart permanent stiffness and body to fabrics and for shrinkage control. This finish may be used with pigments and fillers to obtain unusual permanent effects.

Per-San* 200 H—(WARWICK)—a new addition to the line of Per-San finishes intended to impart antiseptic properties to all types of cotton and rayon fabrics. This is a one-bath product and requires no curing or special aftertreatment.

* Registered Trade-mark.

Poly-Pen No. 68—(BURK-SCHIER)—a wetting agent of the synthetic organic type said to possess exceptionally good surface-active properties. It is further said to be effective in hard or soft water, acid or alkaline baths.

Poly-Tex—(BURK-SCHIER)—a new wetting and scouring agent for the processing of synthetic fibers; it is said to possess

high detergent value and speed of wetting combined with mild and safe action on textiles.

Prestabit Oil C—(GENERAL)—is a textile auxiliary said to possess many valuable features. It is a stable sulfonated oil which is of value as a penetrating and lubricating agent in many dyeing and finishing operations. It is said to combine good stability to lime and magnesium salts with excellent stability to alkaline and to both inorganic and organic acids.

Protex Gel—(CIBA)—said to be a highly efficient protective colloidal agent with the related properties of dispersion, deflocculation and emulsification. It is further said to be an excellent dye leveller and retarding agent.

R

Raylubric No. 52—(HOUGHTON)—a soaking oil for processing rayon yarn for knitting. It is said to effectively lubricate the yarn and to be easily removed in the dyeing operation.

Raylubric No. 101—(HOUGHTON)—an improved coning oil for Bemberg yarn for knitting and for coning mercerized cotton yarn for knitting purposes. It is stated that it is a self-emulsifying oil which will not oxidize or turn rancid and is readily removed prior to dyeing.

Rayonyx Duller R—(ONYX)—this advanced type of duller, just developed for hosiery, is said to mellow the luster of rayon fibers to an enhanced degree. It tends to cover sleaze and when used with water proofing agents induces the tightening of the wales. It is claimed that it shows an increased resistance to washings and is considerably more permanent than ordinary dullers.

Resigum Nos. 50, 51 & 678—(MORNINGSTAR NICOL)—for sizing spun rayon or any spun synthetic yarns. It is said to produce good weaving efficiency with low shedding at the loom.

Resilex No. 117—(PAISLEY)—a synthetic resin for rayon and acetate warp sizing which is said to yield good weaving efficiency and require no other assistants; is readily removed in finishing.

Resipon—(ARKANSAS)—Resipon is a synthetic resin which is offered for finishing all types of textile fabrics where an improved finish is desired. It is said to be particularly useful for stabilizing spun rayons and controlling residual shrinkage in cotton fabrics. It is further said to be suitable for producing a permanent finish on hosiery and may also be used for finishing nylon hose.

Retardit—(ONYX)—a dye retarding agent for all dyestuffs and particularly vat colors. It is also a protective colloid, aiding in protecting animal fibers against deteriorating influences of alkalies. Retardit is said to reduce the speed of coloring fabrics, producing more level and uniform shades. Retardit is further said to make vat colorings on silk and wool more practical.

Rhoplex Resins—(ROHM & HAAS)—during the last year, two new RHoplex resins have been developed. These two resins, RHoplex MR and SR, complete the series of resin finishes which began with RHoplex ER. RHoplex ER forms a film which is said to be very soft and elastic, but not tacky. It is stated that the film produced by RHoplex ER is very close to that produced by Latex with the added advantage of absolute clarity and freedom from odor. RHoplex MR deposits a film which is harder and drier but still elastic. This resin is said to show extremely interesting properties as a water dispersion for coating textiles to give a continuous surface film. RHoplex SR deposits a film which is extremely solvent resistant. This dispersion is of interest in special textile applications where dry-cleaning resistance is a feature.

Rhoplex Size—(ROHM & HAAS)—a new synthetic gum which is of special interest for warp-sizing. It is stated that RHoplex Size is used: 1—As a thickening and binding agent in conjunction with starch on cotton warps; 2—In conjunction with converted starches as a size for spun rayons; 3—As a fluidizer or plasticizer for domestic commercial starches to replace imported root starches; 4—To completely replace natural gums and imported thickeners.

S

S 376—(GLYCO)—plasticizer for use with clay dope dispersions for paper, textile and leather coatings. S 376 can be stirred directly into the converters clay coating dope. The procedure is to add the clay, carnauba wax emulsion, etc., to the pre-cut casein solution, stirring until completely dispersed. S 376 is then added with high speed agitation in amounts of approximately 10 per cent, based on the total solids of the clay dope. The final dispersion which remains stable is said to improve the calendering operation and produces coated sheets with greater water resistance.

Sol-u-bon*—(AAP)—used for dissolving of BONA without the addition of caustic soda and acetic acid. To one part of BONA, 2-3 parts of Sol-u-bon are added and this mixture is dissolved in boiling water. Blacks dyed on Celanese and acetate developed with Developer BON which has been dissolved with Sol-u-bon are said to be distinguished by their full and bloomy shades.

* Registered U. S. Pat. Off.

Solvadine AL Liquid — (CIBA) — a penetrating agent with acid reaction. It is said to be quite stable to acid, alkali, hard water and bleach liquors.

Solvadine NC Conc. Liquid—(CIBA)—a wetting or penetrating agent said to be very stable to various media:—acid, alkali, lime, hydrosulfite, chlorine and peroxide.

Solvenal R—(COMMONWEALTH)—a scouring and boil-off agent for rayon, cotton, acetate rayon and nylon. It is also recommended by the manufacturers for scouring and dyeing in one bath. Wetting agent, emulsifier and leveling agent are compounded with it.

Soromine FW Paste—(GENERAL)—is a softening and finishing agent said to be well suited for use on rayon, rayon mixtures and cotton. It is a white paste of neutral reaction, readily soluble in water. It is not cation-active and can, therefore, be applied directly from the dyebath. It is said to impart a soft, smooth handle, which is not affected by cold rinsing. The product cannot, however, be used in the same bath with basic dyestuffs.

Spun-Jel F—(NATIONAL STARCH)—for the finishing of spun rayon and mixed fiber fabrics in order to produce crisp or full bodied effects. It may be used in conjunction with softening compounds, water repellents, etc.

Stantex 13 (Olive Oil Substitute)—(STANDARD)—This oil is said to replace olive oil in the cotton, acetate, rayon and wool industries. On cotton and rayon, this oil is said to give softer and fuller finishing results. On wool, it gives less fly waste and less ends down in mill production.

Stantex Coning Oil; Stantex Coning Oil No. 1—(STANDARD)—both these oils are adaptable for the coning of viscose yarn in the coning operation. Stantex Coning Oil is not self-emulsifying. Stantex Coning Oil No. 1 is self-emulsifying. Used in the coning operation, these oils are said to give excellent results, making it possible to cone at high speeds. It is stated that there is no corrosion of equipment, less friction to yarn treated, no drag, no gumming or corrosion of knitting needles, resulting in even stitch formation; they are readily removed in the dyeing operation.

Stantex Knitting Oil No. 16—(STANDARD)—this oil is used on the knitting machine and is mixed with water, making a 1½ to 2 per cent solution. It is stated that it will not separate in the

trough, will not corrode or gum needles, gives low friction to yarn, resulting in no drag on the needle.

S/V Copper Naphthenate* 900-A—(SOCONY-VACUUM)—a concentrated fungicide containing 85 per cent copper naphthenate and specifically recommended by the manufacturers for the mildewproofing of military sand bagging cloth. Easily applied in a cold water bath.

* Patented.

S/V Fabrisec M.P. — (SOCONY-VACUUM)—a neutral, easily applied moistureproofing compound said to contain an effective mildewproofing compound. Recommended by the manufacturers for ducks used in the manufacture of tents, awnings and tarpaulins. Contains no volatile or inflammable solvents.

S/V Textile Finishing Oil "A"—(SOCONY-VACUUM) — an odorless, light, stable, finishing compound that is said to form transparent emulsions with water and to be compatible with various types of starches, gums and conventional finishing materials. The manufacturer recommends this oil for addition to warp sizes and other starch mixtures in place of the conventional animal oils. In very dilute form this product is recommended for Sanforizing.

S/V Textile Finishing Oil "B"—(SOCONY VACUUM)—this product is similar to the "A" grade but has greater softening properties.

S/V Textile Finishing Oil "C"—(SOCONY-VACUUM)—similar to "A" and "B" but has been formulated to give the maximum softening effect on high grade cotton, silk and rayon yarns and cloths. The manufacturer claims that this material has a high percentage of active ingredients and is economical to use. It is further claimed that the softening effect is comparable to highest grade, imported sulfonated vegetable oils.

S/V Wetting Agent 1959—(SOCONY-VACUUM)—A light tan, extremely hydroscopic concentrated wetting agent that is said to have very powerful wetting properties. It is relatively free of sodium carbonates and sulfates and contains less than 1 per cent moisture.

S/V Woolrex Oil* No. 700—(SOCONY-VACUUM) — a finished water soluble wool oil recommended by the manufacturers for use in picking wool or worsted clips and for general application to the average grades of all wool and part wool fabrics.

* Trade-marked.

S/V Woolrex Oil* No. 1000—(SOCONY-VACUUM) — a finished water soluble wool oil recommended by the manufacturers for use in oiling the better grades of wool stock. This product is intermediate between the 700 and 2000 grades.

* Trade-marked.

S/V Woolrex Oil* No. 2000—(SOCONY-VACUUM) — a finished water soluble wool oil recommended by the manufacturers for use in oiling the finest grades of wool and converted into high grade carbonized piece dyed cloths.

* Trade-marked.

S/V Worstex Oil* 70 — (SOCONY-VACUUM)—a very light colored, stable, odorless, finished worsted lubricant recommended by the manufacturer for carding, combing, gilling and spinning of worsted rovings, tops and yarns made according to the French System. Stable emulsions are formed by mixing with the required amount of water.

* Trade-marked.

S/V Worstex Oil* CM—(SOCONY-VACUUM)—a light colored, light stable blend of a heavy mineral oil and an approved grade of cocoanut oil. This product is non-emulsifiable and is recommended by the manufacturers for stock carded, combed and converted into various types of worsted yarns where the oil is applied straight. This product meets the recommendations of the Committee appointed by Wool Manufacturing Associations to select a substitute for olive oil. The manufacturer claims that this product has extremely good spinning properties and has had adequate field tests to justify its use.

* Trade-marked.

Synthogel No. 30-P — (MORNINGSTAR NICOL) — a synthetic gelatin easily prepared and as readily removed in finishing. May be used for warp sizing rayons or spun mixtures, and is said to require low percentages of softeners owing to its unusual flexibility.

T

Tergavon C Powder—(CIBA)—a synthetic stable detergent which is said to be very soluble and effective in hard water and acid baths.

Texamine K — (COMMONWEALTH)—said to be a powerful cationic softener and desizing agent, used in dyeing for cleaner and better shades and softness. In kier boiling it is said to eliminate grey-desizing and yield white and softer textiles.

Texol — (BURK-SCHIER) — an organic condensate combining wetting, leveling, and softening properties in a single product. Available in several strengths.

Titaproof SB and ST—(TITAN)—a water-proof product in powder form said to give clear and complete solution and used in the knitted goods trade for wool and mohair facing and cotton back cloth with exceptionally good results. It is claimed that this product does not give any greasy feel such as is produced with water-proofing agents of a wax basis and is very simple to use and does not affect dyed shades. It has only fair mothproofing effects and goods treated with it show an increase in fastness properties to washing and perspiration.

Triton E-79—(ROHM & HAAS)—a new and unique synthetic wetting agent and detergent, said to be unusual in that it is both oil and water soluble. It is stated that the unusual characteristics of Triton E-79 make possible its use as an emulsifying agent in the preparation of oil-in-water emulsions, as a general wetting and wetting back agent, and as a scouring agent which can be used either with or without organic solvents.

Triton NE—(ROHM & HAAS)—a new non-ionic wetting agent and detergent. Chemically, Triton NE is said to be a unique dispersing and penetrating agent inasmuch as it is a high molecular weight complex organic alcohol. Physically, it is said to be unusual because it is non-ionic and compatible with either cation active or anion active materials. The manufacturers recommend Triton NE for use in all types of wetting or cleansing operations where an efficient, economical agent is required.

W

Warco* 945A—(WARWICK)—a sulfated vegetable oil blend designed for use as a finishing agent and on types of fabric where extreme softness is desired. This product is said to be particularly resistant to oxidation and subsequent discoloration and odor development.

* Registered Trade-Mark.

Wool Oil PD 475-A — (SOCONY-VACUUM)—a finished water soluble, extremely light stable, wool oil recommended by the manufacturers specifically for oiling all types of high grade wools. Carding, spinning and scouring properties are said to be excellent. This product is specifically recommended for the finest grades of all wool fabrics including white, pastel shades, etc. It is generally recommended for high grade blankets.

X

Xynoset — (ONYX) — is a cationic color setting agent. It is said to prevent bleeding of direct colors when used in the rinse bath and to prevent bleeding of direct colors by perspiration and other human fluids. It is further said to accomplish its work without any adverse effect on the fibers. Used in the washing of prints it prevents the bleeding of colors on whites when worn.

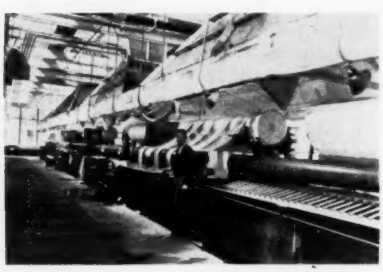
EQUIPMENT

Duplex Take-Over — (RODNEY HUNT)—a new dyeing machine attachment that automatically feeds the cloth in one continuous string instead of many individual strings. The Duplex Take-Over consists of a tapered reel and compensated weight mechanism attached to one side of the dyeing machine. The cloth can be fed into the machine in one continuous string instead of many individual ones. This permits loading the tub full, thereby increasing its capacity by 30 to 50 per cent depending upon the kind of cloth. As the single continuous string feeds through the machine, the reel-and-weight mechanism automatically controls it.

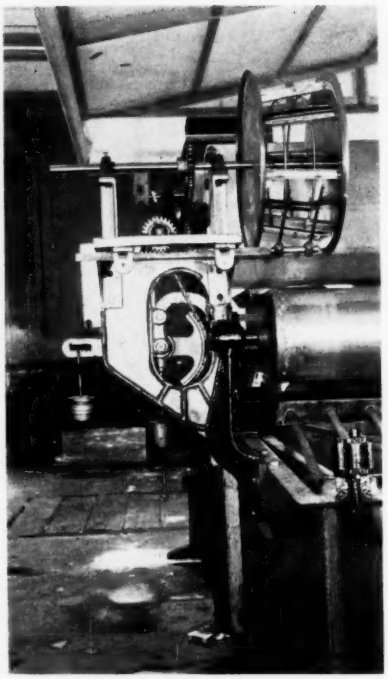
Besides increasing the capacity of the tub, Rodney Hunt points to other savings by the use of the Duplex Take-Over. There is an important saving in labor due to the elimination of time consumed in sewing up and tearing out seams on individual strings of cloth, also the time needed to load and unload many strings instead of one. When the dyeing operation is completed in a machine equipped with a Duplex Take-Over, only one seam has to be torn out in order to unload the whole tub. Thus one man can handle more machines.

There is a saving in material as well, according to Rodney Hunt. Because it is no longer necessary to tear off the sewing on each piece when unloading the machine, they claim that the ⅛ to ¼ yards of goods thrown away in each case means thousands of dollars a year that will be saved in a large mill on this one item alone when using the Take-Over.

One other advantage claimed is uniformity of dyeing because every part of the cloth receives equal treatment in the machine as it goes through in a continuous string. Therefore with this device no care need be taken that cuts are the same length. This is an especially important feature in mass production of fabrics where electric knives are used for cutting.



Showing a Battery of Dyebecks at the Mount Hope Finishing Company Equipped with Rodney Hunt Duplex Take-Over Attachments for Continuous Cloth-Feed Control.



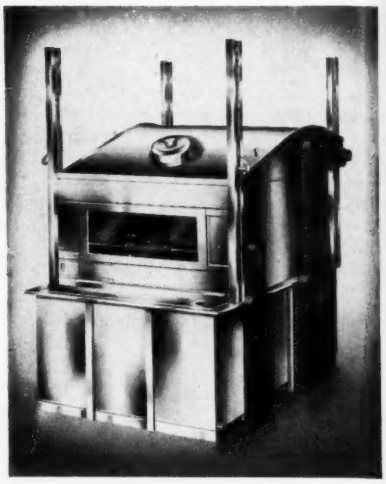
A Close-Up of the Duplex Take-Over Showing Tapered Reel Mechanism and Weight Which Controls the Feed of the Single Continuous String of Cloth Through the Machine.

The Duplex Take-Over will, according to Rodney Hunt, handle any weight of fabric from the lightest rayon to the heaviest woolens with equal ease and effectiveness. It is ideal for rayons, they state, because it saves on dyestuffs and chemicals and because its action is so gentle that there is no possibility of distortion or chafing.

Rodney Hunt is now furnishing the new Duplex Take-Over as extra equipment on its line of "Tru-Shade" Stainless Steel Dyeing Machines. The unit can also be attached to almost all other makes of machines in a few hours time.

Dye Box—(BLICKMAN)—an entirely new dye box made of stainless steel throughout with a hood that completely encloses the work. Doors on each end are counterweighted so that they may be lowered or raised easily. Large windows in the doors allow for examination of the fabric while the material is in work. Ample illumination is furnished by a built- in reflector in the top of the hood.

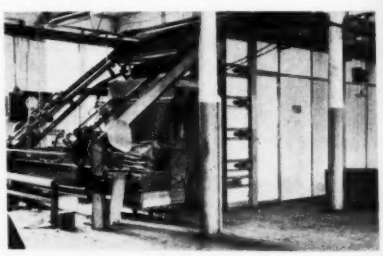
This Blickman Stainless Steel Dye Box is said to provide savings in steam and water. It is further said to protect the material from spots produced by condensation dripping from the ceiling. By reducing escaping steam and heat in the atmosphere, it assures considerable improvement in working conditions in a dye house.



Hooded Dye Box

It is stated that the dye box itself is made with round corner construction to increase strength, to speed cleaning and to assure true shades through elimination of dyestuff collecting in sharp corners. Reels are entirely independent of the box itself.

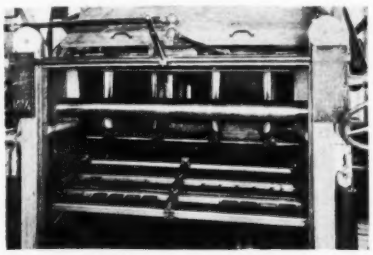
Fleet Line Cloth Tenter Dryer—(RIGGS & LOMBARD)—the cloth enters this machine at the top, passes through in horizontal loops on a pin chain with heat treated Monel pins and is delivered at the bottom of the same end. The horizontal loops form pockets in alternate passes, into which hot air is blown. All of this air is forced through porous fabrics, part going to the exhaust and the balance back to the heaters. It is convertible to an all surface type of dryer for non-porous fabrics by opening dampers at the ends of the pockets. The damper mechanism is fastened to the tracks which are adjustable to various widths. It is stated that drying is uniform



Fleet Line Horizontal Cloth Dryer

and graduated temperature zones prevent overdrying. The cloth comes out free from distortion.

Fleet Line Position Changer for Fulling Mills—(RIGGS & LOMBARD)—this device, regularly furnished with Fleet Line Fulling Mills, when required can also



Position Changer on Fleet Line Fulling Mill

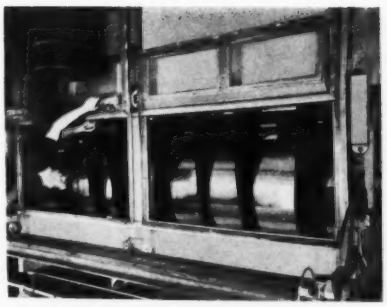
be applied to other makes of fulling mills. It is stated that it changes the positions of pieces while running, thus effecting more uniform fulling and preventing fulling creases and wrinkles. It works like a trombone and is released for shifting by unscrewing a thumb nut.

Fleet Line Stock Dye Kettle—(RIGGS & LOMBARD)—this machine can now be furnished with tilting cover as illustrated, if desired. Other features are unit construction which eliminates all outside circulating

Tilting Cover on Fleet Line Stock Dye Kettle

pipes and permits increased volume of circulation without increasing velocity. Vertical pump, submerged in dye liquor, eliminates packing and leaking. Motor on top of machine away from steam and water. Stock unloaded in cheese form on false bottom with electric hoist.

Fleet Line Type TLBT Piece Dye Kettle—(RIGGS & LOMBARD)—dyes fabrics ranging from 5 oz. flannels to 32 oz. meltons, from worsted shirtings through gabardines to heavy men's wear serges and from knitted shoe linings to heavy knitted ski cloth. Multi-Grip drum reel with par-

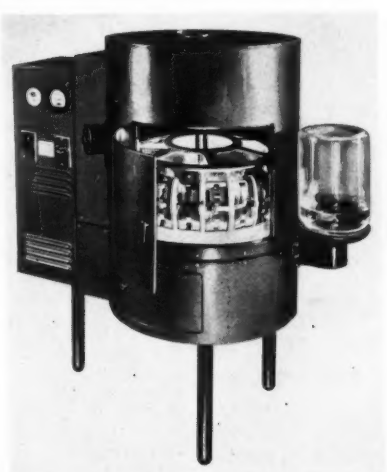


Fleet Line Type TLBT Piece Dye Kettle

tially knurled surface virtually is said to eliminate tangles, tieups, wrinkles, creases, streaks and slipping. Proper ratio of dye liquor per lb. of cloth effects substantial savings in dyestuffs. Stainless steel construction. Improved heating and rinsing systems save time and improve work.

"National"* Accelerated Fading Unit—Type XV—(NATIONAL CARBON)—a new accelerated testing unit, designed, it is claimed, to provide a true standard for comparing the color fastness of dyes, dyed textiles, paper, plastics and other products. The company states that it contains all the elements essential to the accurate determination of color fastness under closely controlled and reproducible conditions. To assure the duplication of the fading effects produced by natural sunlight, the source of radiation selected for this testing unit is the flame type carbon arc using "National" Sunshine Carbons. This source of radiation is claimed to give closer approximation to the full spectrum of natural sunlight than any other artificial source of suitable intensity. Still closer approximation to natural conditions is obtained by enclosing the arcs in a cylinder of Corex "D" glass which filters out most wave lengths not present in sunlight.

"National" Accelerated Fading Unit



Eighteen specially designed sample holders are carried on a revolving rack within the enclosing drum. A motor mounted on the outside of the drum drives the rack at a speed of one revolution per minute. The centrally located carbon arc supplies radiation of uniform quality and intensity at the surface of the test samples.

The revolving rack and samples are in a practically enclosed chamber over a humidifier. The humidifier consists of an annular water trough located directly below the sample holders and containing an immersion heater with automatic thermostat control. Humidity is adjusted to the value desired by turning the calibrated knob of the thermostat thereby permitting test conditions of either high or low relative humidity to be maintained.

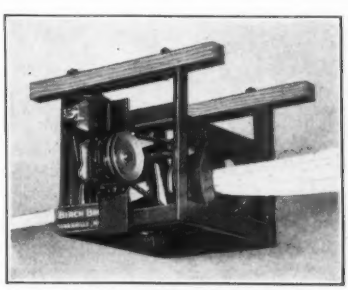
Three pairs of carbons are used in the arc lamp but the arc burns between only one pair at a given time. This allows the lamp to be operated for at least 24 hours without requiring the replacement of carbons. Control of the arc is entirely automatic.

A toggle switch on the front of the control cabinet starts all the operating elements of the unit. Operation of the arc continues under automatic control for a period of at least 24 hours without further attention. An ammeter which registers the arc current is mounted on the control cabinet and a time meter mounted near the ammeter provides accurate record elapsed operating time.

It is stated that compact construction, simplicity of operation and modern design are important features of this unit. The unit is 55¾ inches high and occupies an overall floor space 53 by 30 inches. All internal parts are made from corrosive resistant materials.

* Trade Name.

Cook's Patent De-Twisting Machine—(BIRCH)—it has long been desirable to have some means of keeping the twist in fabrics back from the Scutcher or other Opener. This De-Twisting Machine, which is composed of a revolvable unit through which the cloth passes, is said to answer



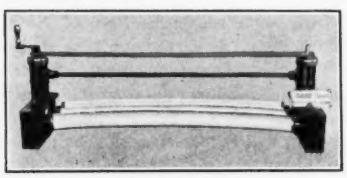
Horizontal De-Twister

this need. Previously, to keep too much twist from accumulating, it was necessary to spin the truck or break the cloth at a

seam so as to eliminate this accumulation. The machine, while it is not claimed that it will eliminate breaking of the seams or stopping entirely, is said to reduce them to a minimum, thus permitting greater production and less lost time. It is also found that with the twist kept back from the Opener or Scutcher that the Scutcher functions better.

Scutcher—(BIRCH)—for rayon fabrics. It is said to be working out successfully on practically all types of rayons. It is stated that this scutcher guides the fabric satisfactorily and also eliminates the chafing which occurred when the ordinary cotton type Scutcher was used.

Three-Bar Curved Rubber Expander—(BIRCH)—a three-bar curved rubber expander, the particular features of which are the much heavier wall of rubber, giving longer life; and better stretch; and a trouble-proof bushing. It is stated that when shown at the Southern Textile Exposition, the Expander was instantly accepted and its merits recognized.



Three-Bar Curved Rubber Expander

Single Curved-Bar Rubber Expander—(BIRCH)—a single curved-bar rubber expander which has the same features as the above Three-Bar Expander.

Perch—(BIRCH)—a simplified type finish perch for woolen and worsted mills, the perch having a forward, reverse, and variable speed drive and the inspection board being fitted with a through-lighting panel equipped with fluorescent lights. The machine also is arranged to measure and either roll the goods in a full width roll, or fold them.

Solu-bridge — (INDUSTRIAL) — an instrument which permits checking rinsing operations by a simple method. It is claimed that, in production routines where a rinse is involved, the degree or thoroughness of which is vitally important, it now becomes feasible to take readings in such direct terms as percentage of carry-over present, without resorting to titration or other chemical means.

This instrumentation centers about the solu-bridge, which in turn is based on the principle of electrical conductivity of industrial solutions or rinsing baths. The instrument comprises a Wheatstone bridge for the measurement of resistance to the flow of electricity through given liquids. A "magic eye" similar to that used in tuning a modern radio, serves as the indicator of circuit balance. The instrument panel carries two knobs. One is set for the approximate temperature of the rinse water or solution. The other, or main dial knob, is adjusted until the indicator reaches its largest dark segment, indicating circuit balance. The reading in the desired terms, such as parts per million or carry-over or contamination, is now taken directly off the main dial. An off-power switch completes the controls of the instrument. It is stated that any industrial worker can operate the solu-bridge without chemical or technical skill.

Solu-Bridge, Model RD-4

KEY TO MANUFACTURERS

AAP—American Aniline Products, Inc., 50 Union Square, New York, N. Y.
ARNOLD-HOFFMAN—Arnold, Hoffman & Co., Inc., Providence, R.I.
ALTHOUSE—Althouse Chemical Co., Reading, Pa.
AMALGAMATED—Amalgamated Chemical Corp., Auburn St. and Trenton Ave., Philadelphia, Pa.
AQUA-SEC—Aqua-Sec Corp., 1450 Broadway, New York, N. Y.
ARIDYE—Aridye Corp., Fairlawn, N. J.
ARKANSAS—Arkansas Co., Inc., P. O. Box 210, Newark, N. J.
BIRCH—Birch Brothers, Inc., 32 Kent Street, Somerville, Mass.
BLICKMAN—S. Blickman, Inc., Weehawken, N. J.
BURK-SCHIER—Burkart-Schier Chemical Co., Chattanooga, Tenn.
CALCO—Calco Chemical Division, American Cyanamid Co., Bound Brook, N. J.
CHEMICAL—Chemical Marketing Co., Inc., 10 East 40th St., New York, N. Y.
CIBA—Ciba Company, Inc., Greenwich and Morton Sts., New York, N. Y.
COMMONWEALTH—Commonwealth Color & Chemical Co., Nevins, Butler and Baltic Sts., Brooklyn, N. Y.
CYANAMID—American Cyanamid & Chemical Corp., 30 Rockefeller Plaza, New York, N. Y.
DUPONT—E. I. duPont de Nemours & Co., Inc., Wilmington, Del.
GEIGY—Geigy Company, Inc., 89 Barclay St., New York, N. Y.
GENERAL—General Dyestuff Corp., 435 Hudson St., New York, N. Y.
GLYCO—Glyco Products Co., Inc., 230 King St., Brooklyn, N. Y.
HART—Hart Products Corp., 1440 Broadway, New York, N. Y.
HOUGHTON—E. F. Houghton & Co., Third, American and Somerserse Sts., Philadelphia, Pa.
INDUSTRIAL—Industrial Instruments, Inc., 156 Culver Ave., Jersey City, N. J.
KEM—Kem Products Co., Inc., 229 High St., Newark, N. J.
McCARTY—McCarty Aniline & Extract Co., Paterson, N. J.
MORNINGSTAR-NICOL—Morningstar, Nicol, Inc., 630 West 51st St., New York, N. Y.
NATIONAL—National Aniline & Chemical Co., Inc., 40 Rector St., New York, N. Y.
NATIONAL CARBON—National Carbon Co., Inc., Carbon Sales Division, P. O. Box 6087, Cleveland, Ohio.
NATIONAL STARCH—National Starch Products, Inc., 820 Greenwich St., New York, N. Y.
NEUBERG—Neuberg Chemical Corp., 441 Lexington Ave., New York, N. Y.
NOPCO—National Oil Products Co., Inc., First and Essex Sts., Harrison, N. J.
NYANZA—Nyanza Color & Chemical Co., Inc., 215 Water St., New York, N. Y.
ONYX—Onyx Oil & Chemical Co., Jersey City, N. J.
P & G—Procter & Gamble Co., M. A. & R. Building, Ivorydale, Ohio.
PAISLEY—Paisley Products, Inc., 630 West 51st St,. New York, N. Y.
PEERLESS—Peerless Color Co., 521 North Ave., Plainfield, N. J.
PHOENIX—Phoenix Color & Chemical Co., Inc., 24 Van Houten St., Paterson, N. J.
RIGGS & LOMBARD—Riggs & Lombard, Inc., Foot of Suffolk St., Lowell, Mass.
RODNEY HUNT—Rodney Hunt Machine Co., Orange, Mass.
ROHM & HAAS—Rohm & Haas Co., Inc., 222 West Washington Square, Philadelphia, Pa.
SANDOZ—Sandoz Chemical Works, Inc., 61 Van Dam St., New York, N. Y.
SOCONY-VACUUM—Socony-Vacuum Oil Co., Inc., 26 Broadway, New York, N. Y.
STANDARD—Standard Chemical Products, Inc., Hoboken, N. J.
TITAN—Titan Chemical Products, Inc., Mill Road and Wayne St., Jersey City, N. J.
WARWICK—Warwick Chemical Co., West Warwick, R. I.
WOLF—Jacques Wolf & Co., Passaic, N. J.

1941

A Yardstick in Textile Finishing

KENNETH H. BARNARD

EVERY storekeeper takes stock at least once a year and it is not a bad idea for the textile chemists to yard off this year's accomplishments in order to see what progress they are making. If we confine our stock-taking to the field of textile finishes, probably the outstanding development is the electrostatic production of pile fabrics. Here is a novel electrical solution of an old mechanical problem, namely the production of vertical tufts of short fibers on the surface of a woven fabric. The old way consisted of weaving in supplementary yarns in loops which when cut and finished, gave the familiar velvet or pile result. Considerable yarn was wasted in anchoring these loops and the density of the pile was rather strictly limited by the size and number of the yarns which could be crowded into the base cloth. In the modern method, a hopper is filled with cut flock of any fiber in lengths between 0.02 and 0.07 inches. This is placed in a highly charged electrical field induced between two electrodes. One of these, the positive one, is just under the cloth to be treated which travels under the hopper, feeding the flock down on the cloth. The electrical charge has two results: first, it orients the fibers in the hopper so that they are all vertical and parallel and second, it drives them down like arrows onto the top surface of the cloth passing under the hopper. To make them stick, the cloth is coated on its top surface with an adhesive, generally of a rubberlike nature and the force of the charge embeds them for perhaps a third of their length. By this method, many more fibers can be placed per square inch of cloth surface, giving a thicker, richer pile; they are more firmly held and they are 100% vertical which gives a more resilient pile. These practical advantages from a quality standpoint are supplemented by a lower overall cost of production and the possibility of designs in different colored flocks or in variety of fibers. It is not strange, therefore, that this development has exhibited a steady growth in 1941.

Another new finish which the 1941 yardstick brings to light is the use of synthetic thermoplastic resins such as Vinyarn and plasticized cellulose acetate in making felts. Here is another old mechanical process,—a really antique one, as felts were made before cloth was woven,—which has felt the effect of modern chemistry. By mixing Vinyarn, for example, with the hair or fur fibers and heating the mass under pressure, an excellent felt is obtained at a lower cost. It is possible to felt by this means fibers that cannot be felted in the old mechanical way.

These two examples are typical of 1941 in textile finishes. This year, like the one before it and the one before that, continues to show a rising curve for the production of synthetic finishing materials, replacing the older natural ones. The variety of these synthetics is also increasing as well as their volume. Whereas a few years back, we merely had the synthetic wetting out agents, we now have cationic softeners, water repellents, fire retardants, aids against shrinkage, as well as a kaleidoscopic variety of resins which will answer any finisher's problem including some he does not yet know exist. In spite of a world at war, the synthetic finishing materials will show a gain in production over 1940 of from 15% to 100%, which would be phenomenal in any business but this one. This gain is mostly in the urea formaldehyde type of thermal-setting resins. No doubt, the increase would have been even larger if production by the chemical manufacturers were not curtailed by a stringency in their raw materials such as chlorine, formaldehyde and fixed nitrogen, and the diversion of a large part of their production to the plastic requirements of the war industries. They are meeting this problem by substituting other materials for their former supplies as far as they can and at the same time are expanding their capacities to take care of both the strictly military demand for plastics and textile requirements for finishes, which in the past has had little military application. The war department, however, is now asking for new fireproof and mildew proofing treatments for burlap which are wash fast as well. Also the shortage of silk has led to attempts to replace it with nylon for parachutes and with purified cotton for powder bags. What progress is being made in these problems cannot be reported specifically expect to say that real progress is being made.

As a matter of fact, the chemical manufacturer finds himself being rapidly pushed between the upper and the nether millstone, as on the one hand, his raw materials are getting tighter and tighter, and on the other hand, he is being urged to produce new products while he cannot make enough of his regular ones to satisfy the current demand.

In general, I should say one distinct trend in 1941 in the field of textile finishing is the growing emphasis on service or utility characteristics as opposed to the artistic or style characteristics of hand, color, drape, etc. Perhaps this is equivalent to the mechanical age of textiles, but

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NATIONAL DEFENSE AND DYESTUFFS

HENRY F. HERRMANN

AMERICAN industry is passing through a revolution —social, economic and scientific—incomparable with any other experience in its history. The "all-out" effort of this nation to arm itself against aggression has created the biggest industrial program in the history of the world. Only a few decades ago wars were waged by factors especially created and maintained for the purpose. Kings called out armies and navies long prepared for action and impatiently waiting for the bugle summoning them to the battle front. Huge warehouses disgorged the nation's forethought in military stores of all kinds. The hope of victory lay in the possibility of vanquishing the enemy while the prepared stocks of war materials lasted and exceeded those of the other side.

Today the fundamental principle remains unchanged, but the method of approach is different. America emerged from World War No. 1 tired of war and dedicated to peace. Isolation from Europe's political and economic wrangles became the nation's dominant ideal. It wasn't so many years ago that the U. S. A. led the world's maritime powers in a movement aimed at naval disarmament. The famous 5-5-3 treaty was the tangible result. With it were coupled the decommissioning of many American war ships—the destruction of two dreadnaughts still in the ways but nearing completion. Expenditures for Army, Naval and military aeronautical purposes were held to a minimum and it became good political strategy to fight budgets for these branches in the Congress as needless waste. We were living in a fool's paradise when this nation dreamed that the Millennium had arrived and beat its armaments into plowshares.

What confronts us today is a complete face about. A nation of one hundred and twenty million people is preparing itself for an emergency involving the existence of its democratic principles of life. This resurgence to military activity carries with it unescapable problems of industrial and economic dislocation which confront every manufacturer large and small regardless of his particular line of endeavor. The nation is arming and the effort is a total one. No separate detached group of military geniuses is working apart from industry as a whole. The country as a unit is girding itself. Every man, woman and child contributes something to the effort—makes some sacrifice —not just in the payment of taxes, but in their daily experiences.

Where does the Dyestuff Industry fit into this picture? Those who did not learn the lesson of World War No. 1, or who did not experience those harrying days now can see the intricate interlocking of chemicals with our national life and safety. The basic materials of national defense are metals, alloys, plastics, explosives, rubber, fabrics for uniforms and countless other applications, paper, ink, toxic and benign gases, paints—to scan the list superficially. Chemistry plays a vital role in each of these. Although the layman does not consider dyestuffs intimately associated with the defense program except possibly for military and naval woolen and cotton cloths it can be shown that the interlocking of basic and secondary chemicals is so close that the dyestuff industry finds itself in the center of the complex program.

A few examples will illustrate this.

Toluene is the base of T N T and other toluene explosives—the most important ones for our great guns. From it are derived a group of dyestuff intermediates and from them in turn a host of dyes which are in consequence very scarce.

Aniline finds its way into diphenylamine—a gun powder stabilizer and the government is taking the bulk of the country's production for defense purposes. Aniline is also the most important accelerator for rubber and obviously the tires and other rubber parts of our military machines, trucks, tanks and aeroplanes pre-empt this chemical for defense purposes. One quite overlooks the fact that the dyestuff industry was founded on aniline oil and that it has always been its largest producer. With 80-85 per cent of the formerly freely available aniline diverted from peace-time applications to defense requirements one can picture the problem of the dyestuff manufacturer in continuing his line of colors. About 250 actively used dyestuffs are directly or secondarily dependent on aniline.

The widespread application of aniline is indicated by the following few examples:—

Naphthol Blue Black B—

This is not a defense color, but is the base of most blacks for ladies' woolen fabrics, for wool and fur felt hats; for leather dyeing, paper, woodstaining, etc.

Soluble Ink Blues—

These blues are heavily in demand, because of the purchases of ink by the Government branches, as well as the Army, Navy and Military Training Camps. These increased requirements are added to the normal civilian needs. One ton of this blue requires 1,500 lbs. of aniline oil in its manufacture.

Nigrosines—

These valuable black dyestuffs are produced in immense

quantities in several forms:—

As water soluble dyes for leather, paper, etc.
as Spirit Soluble Blacks for lacquers
as Oil Soluble Blacks for leather dressings and dyes
as Moulding Blacks for phenolic resins for which

purpose alone the consumption is at least 150.000 lbs. per month. Each ton of Nigrosine base requires 1,300 to 1,400 lbs. of aniline oil.

Direct Blacks—

The aniline oil required per ton of these products is not large, but the aggregate consumption because of the huge monthly production of these dyes is very heavy.

Sulfon Cyanine Blues and Blacks
Indocyanine
Naphthol AS
Developed Acetate Blacks
Bismarck Brown
Chrysoidine
Alizarine Blue Black B—An important dye for woolen uniform fabrics
Sudan Dyes
Fast Light Yellow 3G and 2G

All of the above dyes are technically important. As mentioned before upwards of 250 individual colors are involved, the production of which is jeopardized by the present shortage of aniline oil.

Another outstanding example is phthallic anhydride. To the defense program this product is of utmost importance as a component of plastics for aeroplane and many other applications. To the dye manufacturer it represents the starting material for anthraquinone, the basic element of the best vat, alizarine-chrome and acid dyes and the very important group of pigments—the Phthallocyanine Blues and Greens. The government needs these dyes above all others for the production of cotton and woolen uniform fabrics, camouflage paints, etc. Heavy demands are made on the industry for these dyes on the part of mills which are processing contracts for the Quartermaster, the Navy and Marine Corps, not to mention many auxiliary services.

Those who see in war preparations only the manufacture of guns, tanks and planes, may feel that the diversion of a product such as phthallic anhydride for dyestuff purposes constitutes waste during our hour of need. This is very shortsighted. National defense is based on men first—machines second and men must be clothed for self-protection. These dyes are not luxuries. They are as important as guns and powder and in the priorities scale deserve adequate consideration. According to the OPM's scale of importance the majority of military and navy fabrics are granted a priority rating of A-1-i or better, but the best the dye manufacturer has been offered for the procurement of such obviously needed raw materials as have been mentioned is—A-10. Fortunately measures are now under consideration which may correct this situation.

So far the industry has kept fair pace with requirements because of reserve inventories of raw materials available in their own possession or obtainable on the market. By superhuman effort—utilizing every available piece of apparatus, running equipment to the bursting point, the job is being done somehow. This sounds better than it is. Every plant to maintain itself is in a constant state of repair and reconstruction—unit by unit. For months this was overlooked. Plants were expected to run like the Deacon's Wonderful One Horse Shay, without repair or replacement parts till they collapsed, because such parts could not be purchased until the equipment had actually failed. Early in September, however, the chemical industry was granted a blanket priority rating of A-10 for emergency spare parts for the maintenance of its equipment. Generally speaking, this rating is serving the purpose in that the plants are allowed to stock one replacement unit with which to effect repairs when they become necessary.

Other chemicals which figure prominently in the defense picture are chlorine, of which the government has taken for its use one-half of the country's production. Chlorine enters into hundreds of chemicals and secondarily into dyes and pigments which are important and cannot be replaced without sacrifice. The paper industry has been deprived of a substantial portion of the chlorine it is accustomed to using. A ceiling has been placed on the whiteness of bleached paper pulps and quite logically on the whiteness of finished papers. To offset the yellowness of imperfectly bleached pulps, paper manufacturers have been endeavoring to use larger quantities of bluing pigments. The most important of these are the phosphotungstic lakes of certain basic blues and violets. Unfortunately, this has led to a clash of interests involving the use of tungsten in the production of steel alloys for defense machinery, tools and armor. In consequence the amount of tungsten permitted for dyestuff use has been reduced appreciably and the best papers will be marketed appreciably yellower or tinted with fugitive dyes. This alternative seems inconsequential in comparison with the more important question of national security, but it confronts the industry with a serious economic problem. An amusing incident relative to this situation is the rejection by an important government agency of a delivery of correspondence and printing bond paper which complied with the regulations in maximum permitted whiteness on the ground that it was not white enough, but would be accepted if an allowance were made because of this alleged defect. Bleached clays are used for coating papers for printing purposes and the demand is enhanced because of the scarcity of superior imported white clays. This bleaching operation involves the use of sodium hydrosulfite, the production of which can not be increased sufficiently to keep pace with the demand. Naturally, the first call for this chemical is on the part of the dyeing industry for the application of vat dyes and this has grown to almost unbelievable figures.

The author wishes to refrain from citing statistics, because figures can be used very easily to distort vital facts. It suffices to state that the biggest portion of our cotton

industry has been pre-empted for the production of military fabrics of one sort or another—the yardage is measured in the hundreds of million yards and the specified color fastness necessitates the use of anthraquinone vat dyestuffs. The only practical method for applying these dyes is with sodium hydrosulfite. Again we have shown the close interlocking of different trades and commodities: the paper industry versus the cotton industry and tungsten, chlorine versus hydrosulfite.

Urea, which the textile industry requires for permanent cotton and rayon finishes and printing, is almost unobtainable by it because of its importance for the production of plastics. Formaldehyde, phenol and cresyllic acids are in a similar predicament. Other common chemicals which are very scarce are ordinary sodium sulfate, acetic acid, methanol, arsenious acid, potassium permanganate, sulfuric acid, especially oleum, nitric acid, methanol phosphorous trichloride, ethylene oxide and many others. These chemicals are intimately associated with the manufacture of dyestuffs and their lack is a very serious barrier to production in proportion to demands.

At the root of the present upheaval are increased market demands and the government's device designed to protect the manufacturer of the more necessary commodities under "defense" evaluation—namely the Priority system. We believe in this system and have every confidence that the government can work out a method of scientific application which will alleviate unnecessary technical starvation. The essence of the problem is speed. The government's own contracts for badly needed war materials are at stake. Patriotic mills which have taken such contracts are confronted with ruinous penalties in performance clauses because they can not get the necessary materials to meet their obligations. If the Priority system does not fully serve the purpose a new Allocation system may be tried.

Take for example the case of a comparatively medium sized hosiery manufacturer who is invited to bid on an army hose contract. Let us say the bid is for 150,000 dozen cotton socks to be dyed with vat colors. About 12,000 pounds of special vat dyes are required, with caustic soda and hydrosulfite of soda, potassium bichromate, acetic acid, etc., etc. Before the army entered the market neither this manufacturer nor any other hosiery mills had occasion to produce anything like this quantity of khaki cotton hose. Therefore these mills have to procure their supplies of vat dyestuffs without the benefit of previous purchasing experience in this particular line. They are newcomers in the field and their requirements either can not be met by their regular sources of supply, who may not be manufacturers of vat dyestuffs, or they are turned down because the manufacturer's quotas for these commodities are full and new business must be refused. To make matters worse the hosiery mill that entered the bid and is floundering in the supply market may be notified that it has been granted the contract with a 50 per cent increase. The procurement of dyestuffs now becomes a matter of desperate necessity. What is the dyestuff manufacturer who is approached by such a mill expected to do?

A typical case finds the dye plant operating at peak capacity, 24 hours per day, 7 days per week. The output of vat dyes is over sold. The inventory of finished colors and of raw materials is gone. The manufacturer is forced to wait for incoming raw materials to charge his kettles and their output is delivered from the factory floor directly to the consumer. If a break occurs time is lost which can not be made up. Should a raw material fail to arrive the loss of production time pyramids.

The Textile and Chemical Divisions of the O.P.M. have had numerous complaints from textile mills who are unable to complete government contracts within the specified time limit because of their inability to get the deliveries of the necessary dyestuffs on time. In consequence there have been conferences with manufacturers of anthraquinone vat dyestuffs and it is hoped that sufficient phthallic anhydride and other required raw materials will be made available on a more satisfactory schedule. It may be necessary for each textile mill which has defense contracts to submit a statement to the supplier of the dyestuffs regarding the number of pounds of colors called for by these contracts. The dyestuff manufacturers, in turn, will collect this data and submit it to the O.P.M. for an allocation of raw materials which are on priority. Since many of the basic raw materials have been scarce for months, the dyestuff manufacturers have exhausted their inventories and are dependent upon new supplies with which to continue operation. From this it is apparent that any steps which are contemplated to relieve this situation must be taken at once if costly delays are to be avoided.

Earlier in this discussion reference was made to experiences of the dyestuff industry during World War No. I. At that time this country had only an infant industry dependent to a large extent on intermediates of foreign origin. The value of American made dyes during 1913 was $3,000,000—against imports worth $13,000,000. This domestic manufacture was interrupted when the necessary intermediates became unobtainable and had to be manufactured over here. During the ensuing decade our dyestuff industry had its real birth and has grown to an annual production valued at $122,000,000—during 1940 against an importation of only $3,000,000 worth. The dyestuff industry is not huge according to American evaluations, but it is an integral part of the nation's entire chemical industry which with all its related and dependent industries is tremendous. This industry must be supported and its requirements recognized. The government's firm hand in the elimination of speculation and cornering of markets is a splendid achievement but we can not stop there. The raw materials which dye manufacturers need to produce their wares must have the same Priority evaluation as the finished products to assure a continuous flow of dyes for the processing of Government orders and the completion of other contracts.

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Research Activities of the
TEXTILE FOUNDATION

MILTON HARRIS

THE research laboratories of the Textile Foundation at the National Bureau of Standards have now been in existence for three years. During this time, the technical staff has been enlarged to include fourteen people of diversified scientific training.

Especially prominent among the Foundation's undertakings has been the development of a much broader program of research than has heretofore been attempted. Such a program has already been demonstrated to be of wide service to the textile industry. Indeed it might be stated that one aim of the Foundation's program is to supply the basic information concerning the chemical and physical properties of textile fibers which is so vital to the successful solution of the great number of technical problems that are constantly arising in the industry.

The research activities which have been organized to cover all of the important textile fibers, include investigations on the chemical, physical-chemical, mechanical, and morphological properties of fibers. Up to the present time, over thirty technical papers relating to these researches have been published or are in the process of publication. The nature of these researches and the results of some of them are briefly described in the present report.

The development of wools that are strongly resistant to attack by moths, molds, bacteria, alkalies and other chemical reagents and show much less tendency to shrink during laundering has now been achieved. This has been accomplished through modification of the molecular structure of the fiber. It has been shown that many of the important chemical and mechanical properties of wool depend on the presence of disulfide cross-links between the molecular chains of the fiber. At the same time, however, it has been shown that the ease of deterioration of woolen materials is largely dependent on the susceptibility of these cross-links to attack by alkalies, oxidizing and reducing agents, sunlight, etc. These difficulties can now be overcome by the discovery in these laboratories of a process through which the relatively unstable cross-links can be replaced by very stable ones[1]. This process yields a product which is resistant to attack by many chemical agents but still retains the desirable mechanical properties of the original fiber. The same cross-links are also in part responsible for the resistance of wool to the action of various biological agents[2]. For example, untreated wool is resistant to the action of enzymes, while wool in which cross links have been broken is rapidly digested. Since moths and molds, and other biological agents must break cross-links before their digestive enzymes can attack wool, it appeared that the chemically-modified wools containing cross-links of a more stable variety should be quite resistant to such attack. This fact has now been confirmed by experiment, so that it is seen that the modified wools, referred to above, include resistance to moths, molds, and bacteria among their desirable properties[3].

Investigations on the chemistry and structure of cotton revealed that the pectic substance is principally confined to the primary wall [4, 5] and can be removed without causing any significant changes in the tensile strength of the fiber[6]. These studies were considerably aided by the development of a new method for the determination of uronic acids in cellulosic materials[7]. Similar conclusions concerning the pectic substance were obtained in an investigation of the surface characteristics of cotton fibers by the electrophoretic technique[8].

Cellulosic fibers exhibit acidic properties which influence many of their characteristics such as their dyeing and finishing behavior, and have considerable effect on their electrical properties. A study of these acidic properties showed that most of the base or cationic ash combined with the fiber is associated with the acidic groups of the pectic substance[9, 10]. However, a small but definite moiety is associated with the depectinized cotton, indicating the presence of acidic groups in purified cellulose. Esterification of these groups with diazomethane reduced the base-binding capacity or the ash content to nearly zero.

As a forerunner of studies relating to the effect on cellulosic textile fibers of oxidizing agents, which are commonly encountered in bleaching processes, and oxidizing conditions, such as heat and light, methods of analysis for various functional groups which are found in different types of oxycellulose are being developed. It has been found that the aldehyde groups found in certain types of oxycellulose can be determined either by titration with iodine or by analysis for total nitrogen of the oxycellulose subsequent to treatment with hydroxylamine[11]. The former method is similar to one recently developed for the estimation of aldehyde groups in hydrocellulose[12]. Carboxyl groups in reducing types of oxycellulose can be determined electrodialytically[13], and in the non-reducing type of oxycellulose, either by this method or by titration with silver *o*-nitrophenolate[10]. Quantitative data have now been obtained which show that the oxidative attack of cellulose by periodic acid results in a cleavage of the carbon chains in the glucose units between carbon

atoms 2 and 3, with the conversion of the secondary alcohol groups to aldehyde groups. The course of reaction of other oxidizing agents with cellulose is at present being determined.

A detailed investigation is being made of the combination of fibers with acids (including acid dyes), bases, and salts. The experiments to date have been confined to wool and show that the fibers combine stoichiometrically with the anions of acids and the cations of bases, as well as with hydrogen and hydroxyl ions[14, 15, 16]. The anions of different acids were shown to have affinities for wool varying over a many thousand-fold range, resulting in great differences in the amounts of acid bound under identical conditions when different acids are used. The amounts of each acid combined when mixtures are used can be predicted. These findings have a direct bearing on dyeing theory, since they not only furnish an explanation of the wash-fastness of acid dyes, but also indicate how it may be measured and expressed on a quantitative scale. A consistent explanation of the part played by various assistants such as Glauber's salt, in promoting level or solid dyeing, is also indicated by the demonstration that the relative effectiveness of such assistants is directly related to the effectiveness with which they compete (because of their own affinity) with the dye for combination with the fiber.

The mechanical behavior of fabrics in the processes of textile manufacture as well as in the service of the consumer is dependent in part on the mechanical properties of the individual fibers. Much remains to be learned concerning the correlation between the internal chemical structure of the fiber, the size of its molecular constituents, and these properties. Knowledge of these relationships should serve as a guide to the development of better synthetic and regenerated fibers and to the more intelligent modification and use of natural fibers. The chemical modification of different fibers is being studied extensively by the Foundation, and investigations are now being directed toward correlating these chemical changes with the mechanical properties of the fibers[17].

It appears that the properties of a single fiber may be considered to depend on the size of its constituent molecules in somewhat the same manner as the properties of the yarn depend on its staple length. In order to study this dependence in detail, commercial cellulose acetate has been separated into fractions of different average molecular sizes[18]. From these fractions it is possible to form fibers and films containing molecules of known size. The mechanical behavior of such materials is now being investigated. The data obtained from preliminary measurements indicate that the flexibility of acetate films increases with increase in molecular chain length up to a degree of polymerization of 150* and remains constant thereafter. The tensile strength of the films, however, increases with increase in chain length throughout the range investigated.

In view of the existing international situation, the future role of silk in the textile industry in this country is uncertain. Nevertheless, it should be emphasized that silk possesses interesting chemical and physical features, which have been helpful in the better understanding of fiber structure and properties in general. The Foundation has no active silk research projects at this time; however, the results of a few of the earlier investigations may be of interest. Treatment of silk fibroin with diazomethane showed that the hydroxyl groups of tyrosine in the untreated fibers are free[19, 20]. Methylation of these groups by diazomethane appreciably increased the stability of the fibers to light which showed that the photochemical sensitivity of silk is in part associated with its content of tyrosine[21]. A similar stabilizing effect is obtained by alteration of the tyrosine hydroxyl groups through reaction of the fiber with various cationic reagents. A study of the sericin of silk showed that the alleged fractions of this substance, commonly referred to as sericins A, B and C, are artifacts which result from the hydrolytic decomposition of the naturally-occurring sericin during its removal from the raw silk fiber[22].

From measurements of the surface electrical properties of cotton[8], wool[23], silk[24], and nylon[25] by the microelectrophoretic technique, information has been obtained which is of considerable value in evaluating processes involving the surface of fibers such as finishing processes. These experiments also provided a means of locating the isoelectric points of each of these fibers.

A clear perception of the morphological structure of textile fibers is a necessary part of any research into their preperties, or of intelligent application of the many processes which they may have to undergo in the manufacture of yarns and fabrics. Accordingly, the details of structure of the various textile fibers are also being investigated by microscopical methods. An examination of the primary and secondary walls of cotton[25] revealed that the latter consists of innumerable spirally-oriented cellulose fibrils which reverse their direction of winding at frequent intervals. The fibrils are arranged so as to give a layered pattern to the secondary wall. These layers increase in number with increase in age of the fiber. The secondary wall is enclosed by the thin primary wall, which consists of fine criss-crossing strands of cellulose embedded in a membrane consisting principally of wax and pectic materials. Treatment of cotton[26] with cuprammonium reagent dissolves the cellulose, leaving residues which vary in amount and in structure, depending upon the extent of purification of the fibers.

The structural details of the wool fiber and especially of their constituent scale and cortical cells have also been examined[27]. The scales that comprise the outer surface of the fiber show little internal organization, whereas the cortical cells are shown by microdissection to be made up of fibrils, which, unlike the granular nucleus that lies near the center of the cell, are birefringent. A comparison of root and shaft of the fibril reveals numerous differences in reaction to microchemical color tests, as well as differences in cellular structure.

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*That is, a molecule containing 150 anhydroglucose units.

VINYON* SYNTHETIC FIBERS

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VINYON, one of the new synthetic fibers, occupies a unique place among the yarns of our modern industrial age. As pointed out by Bonnet (Ind. Eng. Chem. 32, 1564, 1940) Vinyon is spun as a multifilament yarn by the dry spinning process from a solution of copolymerized vinyl chloride and vinyl acetate, very much as cellulose acetate rayon is spun. The copolymer contains about 90 per cent vinyl chloride and 10 per cent vinyl acetate, polymerization being carried to a molecular weight of approximately 20,000.

In its freshly spun condition Vinyon is weak, its strength averaging not over 1 gram per denier. Its extensibility is, however, very high and it can be stretched several hundred percent of its original length, preferably at elevated temperatures, whereupon a yarn with true elasticity and high tensile strength is obtained. Strengths of 4 grams per denier (77,000 lbs./sq. in.) and upward are easily obtained.

X-ray analysis shows that the stretching procedure causes a certain degree of molecular orientation along the axis of the filaments, whereas in the unstretched yarn the long chain molecules of the vinyl polymer lie in random distribution. This molecular orientation is responsible for the improved yarn characteristics. Similar orientations are obtained with some other fibers, for instance nylon or stretched viscose rayon, but in contrast with these yarns, Vinyon, stretched or unstretched, shows little sign of crystallization.

One of the outstanding characteristics of Vinyon is the fact that the stretching operation is reversible, in that at elevated temperatures shrinkage of the stretched filaments occurs up to seventy-five percent of their stretched length. A Vinyon thread immersed in boiling water behaves like a rubber thread; it extends under tension and contracts on release, and this cycle can be repeated indefinitely. X-ray diffraction patterns reveal that the molecular orientation of the stretched fiber disappears entirely when the Vinyon has been shrunk, in which respect it is similar in behavior to natural rubber.

A study of the problem of dyeing Vinyon has led to some interesting developments. The dyeing difficulties to be overcome in the case of Vinyon were very similar to the obstacles which the dyer faced with cellulose acetate yarns and fabrics in the early days of acetate dyeing. These difficulties were caused by the resistance of acetate rayon to water penetration and its lack of affinity for nearly all dyestuffs which were available at that period. Consequently, the development of an entirely new line of dyes for cellulose acetate was necessary. These dyestuffs appear to have little or no direct affinity for cellulose acetate but are soluble in this plastic material and are dissolved by it (K. H. Meyer, C. Schuster, and W. Bülow, Melliands Textilb. (6, 737, (1925), 7, 29 (1926)). It has been shown that the distribution coefficient of the dyestuffs between bath and fiber at a given temperature is constant after the dyeing has been carried out, regardless of the initial dye concentration in the bath. It was desirable, therefore, from a practical standpoint to use dyestuffs which were practically insoluble in water since under such conditions, a good exhaustion of the bath could be accomplished. For this reason the greater number of the acetate dyestuffs used today belongs to the suspension or dispersion type.

The same approach was applied to the dyeing of Vinyon and the water insoluble acetate dyestuffs have actually been found to be well suited for the dyeing of Vinyon when they are used in combination with certain assistants. These assistants are liquid or solid materials which are likewise readily dissolved by the Vinyon fiber and which are only slightly soluble or insoluble in water. They improve the solubility of the acetate dyestuffs in the Vinyon fiber. This is particularly necessary as the dyeing cannot be carried out at a temperature above 65° C. since above this temperature shrinkage of yarn or fabric occurs.

The action of the liquid assistants in the dyebath, e.g. methyl isopropyl ketone, di-esters of phthalic acid, and others, can be explained by a swelling of the fiber which takes place when the resin absorbs these compounds. The dyestuffs can then freely migrate into the opened structure of the fiber. It is interesting to note that Vinyon will also absorb from aqueous dispersions solid chemicals like aromatic hydrocarbons, phenols, esters, ketones and others which are present in finely divided form and that during this process acetate dyestuffs, which may be present, are carried into the fiber.

The water itself does not enter into the process since it can be shown that Vinyon fiber covered with insoluble acetate dyestuff and solid assistant, for instance o-hydroxydiphenyl, will be definitely dyed after a few weeks at room temperature. At elevated temperatures the process can be accelerated. Similar behavior in the case of cellulose acetate will be recalled in the experiments of Kartaschoff (Helv. Chim. Acta., 8, 928, 1925; 9, 152, 1926). Appar-

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*Trade-mark property of Carbide & Carbon Chemical Corp.

Recent Developments in

TEXTILE PRINTING

P. J. WOOD, F.A.I.C.
Technical Traveler, Royce Chemical Co.

SINCE the last report made on this subject in 1939 in the AMERICAN DYESTUFF REPORTER, Vol. 28, p. 493, the outstanding improvement in textile printing appears to be the further development of the high speed printing machine.

It is claimed that speeds up to 300 yards per minute are possible with the latest type of high speed machine. On what type of goods and patterns this estimate is predicated, no information is available.

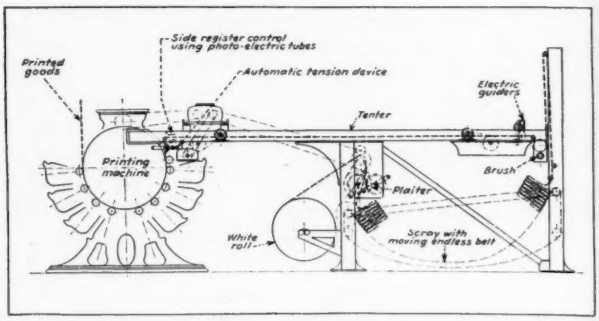
However actual tests run in one print works indicate that they can easily print 100,000 yards in eighteen hours and have printed as much as 72,000 yards in ten hours. The printing speeds range from 180 to 230 yards per minute.

Since the machines are equipped with anti-friction bearings throughout, the horsepower consumption is very nominal. As an illustration, printing two colors with one drag roll at 185 yards per minute, the complete machine required only 14.18 horsepower.

Basic changes in the construction of the machine have been necessary in order to accomplish this result.

Revolutionary changes have been made in the back-rigging to provide for continuous feeding of goods and grey cloth, where used, together with a device for feeding these two cloths at controlled uniform tension and a mechanism for correctly aligning them. Accurate guiding of the blanket is similarly taken care of. The wool and linen lapping has been eliminated by covering the cylinder with rubber, eliminating lapping marks.

The side frames are built much heavier, thus securing freedom from vibration.



In this set-up a short tenter frame has been used to secure high speed operation and possibly more accurate tracking of the cloth.

Pressure levers have been eliminated, and the traverse is motor driven.

Anti-friction bearings replace the conventional type in traverse, doctor bearings and star gear. Positive lubrication of all bearings is provided.

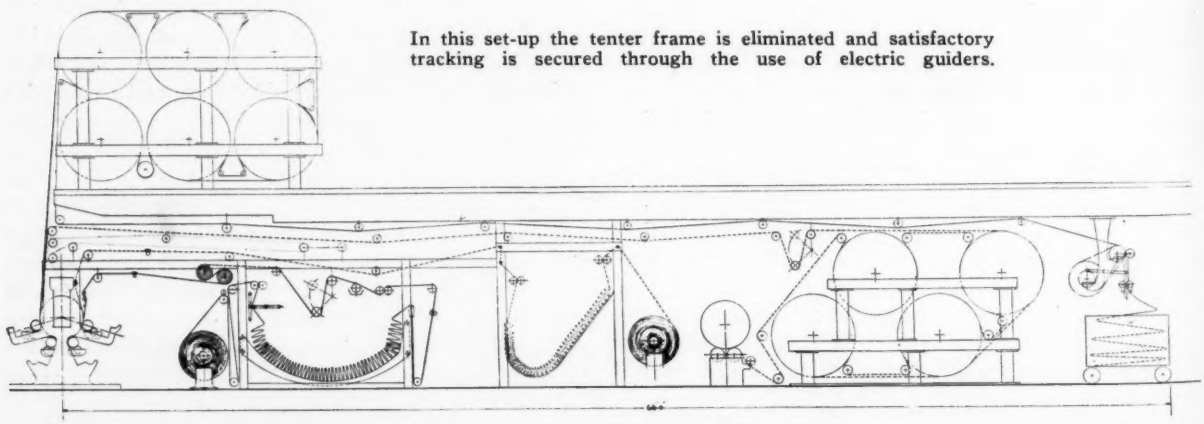
The machine is furnished with self-aligning Mandrel bearings.

It is said that grey rolls can be doffed at high speed.

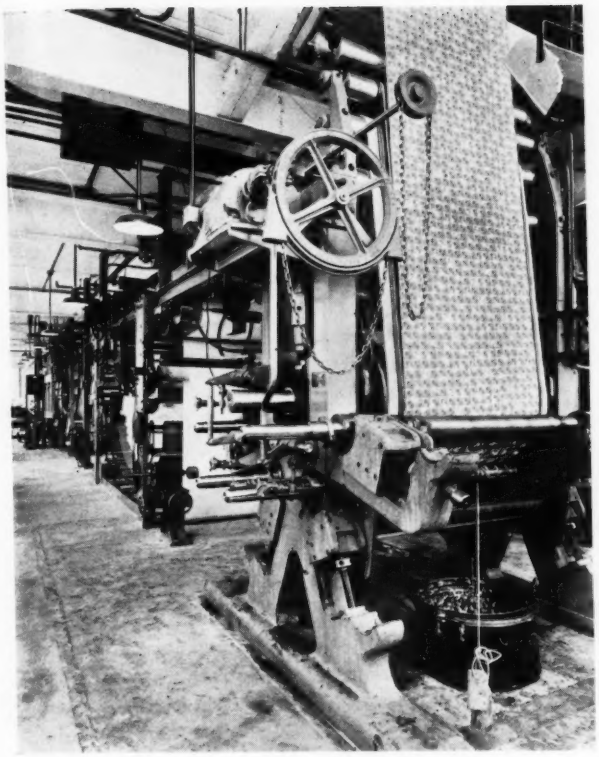
A new high speed folder completes the list of changes bearing directly on high speed operation of the machine.

Other objectives said to have been attained include reduction in horsepower requirements by elimination of hot bearings and of bearing end thrust, also reduction in printing pressures, giving less deflection of Mandrels under pressure, which should result in longer life, obviating the necessity for using packs.

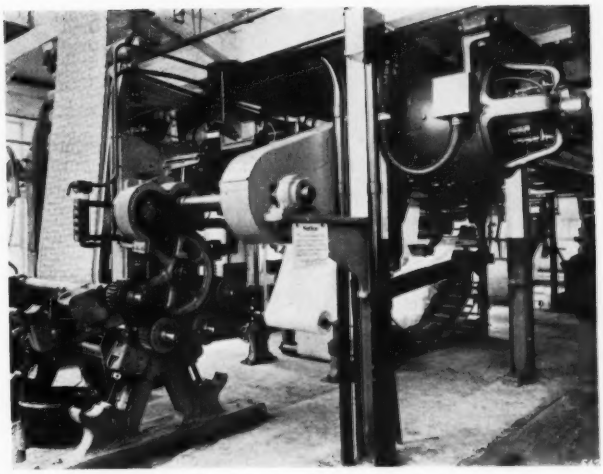
Several other improvements are apparent which, while not contributing directly to the high speed operation of



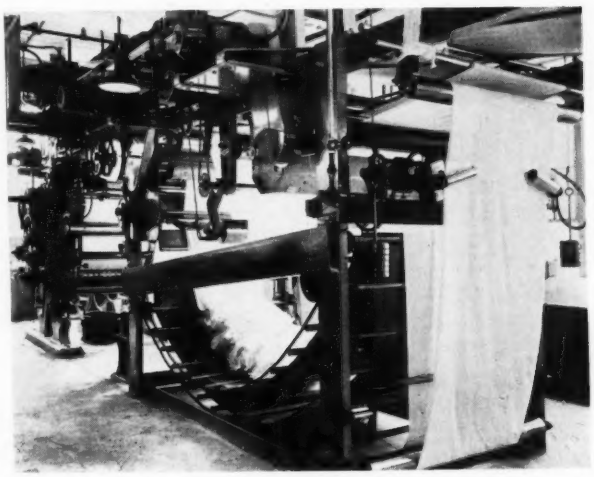
In this set-up the tenter frame is eliminated and satisfactory tracking is secured through the use of electric guiders.



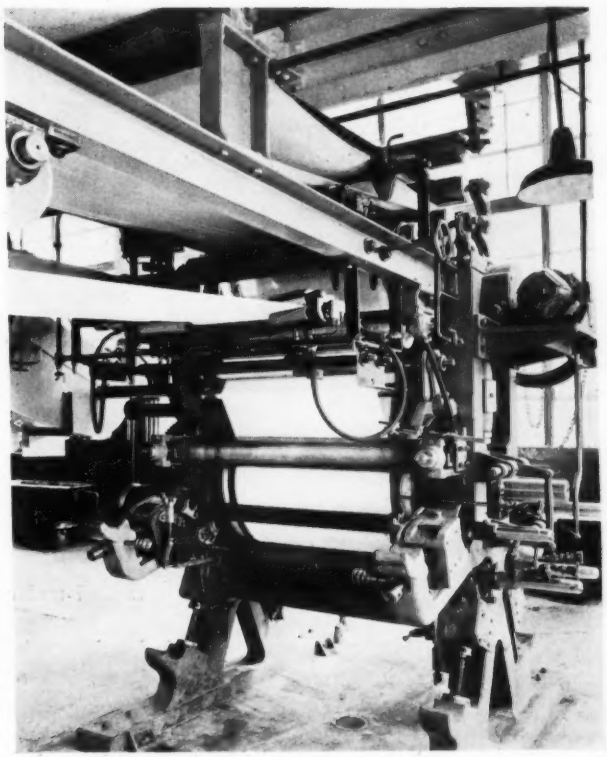
An actual installation similar to that represented in the diagram at the bottom of the preceding page.



Drive side of machine.



This shows the detail of installation of the scray at the rear of the printing machine. The accumulating conveyor permits continuous feeding of goods to the machine.



This indicates the manner in which the cloth is threaded into the machine under controlled tension and localized with the engraving

the machine when it is actually running, will undoubtedly serve to reduce the non-productive time, roller, blanket and color changes.

For example: convenient location of nip springs; an improved cylinder lift rig; an improved method of changing the blanket; the location of the drive shaft is constant at all times and is high enough to give plenty of head room; the star gear is removable without moving bearing; a better means of holding Mandrel gears to Mandrels; also better design of color pans and hangers.

While higher speeds are possible with regular printing colors employing the regular set-up of blanket and back greys, it is likely that even higher speeds may be attainable by eliminating both blanket and back grey and printing on the rubber covered cylinder.

This procedure could only be followed if the patterns

printed are lightly enough engraved so that the color would not penetrate the goods and soil the rubber, or if the cloth is thick enough to prevent such penetration.

In this event, the milled ring would have to be eliminated from the printing rollers or the rubber "lapping" would have to be made the exact width of the goods, in which case the ends of the printing rollers would not impinge on the lapping, and no soiling would occur.

* * *

Illustrations for this article were furnished through the courtesy of the Rice Barton Co., Worcester, Mass., and the Cranston Print Works.

Vinyon Synthetic Fibers—

(Concluded from page 575)

ently the aqueous dyeing procedure simply accomplishes the purpose of getting good distribution and contact of the materials with the fiber and provides a good medium for operating at higher than room temperature. Dyestuff and assistant are directly absorbed by the fiber in their solid, crystalline state and it seems that in an aqueous dyebath they need not pass through the stage of solution in water.

The unique properties of Vinyon offer many interesting and practical possibilities. The first application to make use of the shrinking property consisted in governing the porosity of Vinyon filter cloths. The density of such fabrics can be controlled by a regulated heat treatment with a resulting contraction which is definite for the temperature to which the cloth is subjected. The thermoplasticity of Vinyon in addition to its shrinkage property, leads to certain moulding processes where an entirely new industry seems to be in the making. Vinyon fabric can be wrapped around forms and through the application of heat it not only shrinks tightly around the mould, but at higher temperatures can actually be fused in place. After cooling, the fabric can be slipped off in stiffened shape. Ladies' hat forms of the buckram type, for example, are cheaply and efficiently made by such a procedure. A knitted mesh fabric when heat treated under tension does not shrink in length or width, but its construction opens up. By partial or complete fusion it can be obtained in different degrees of stiffness without loss of strength. It shows great promise for the footwear trade where it is used for shoe uppers. Its resistance to abrasion, its endurance during repeated flexing, and its perfect water-repellency, are some of the outstanding features which should make this application very successful.

Vinyon staple fiber has been mixed with wool or cellulosic fibers in the manufacture of felts and yarns. The contraction through heat of the Vinyon staple is effective in the felting process. By applying higher temperatures (above 135° C.), the tackiness of the fibers leads to a bonding between Vinyon and the other components of felt, yarn, or fabric, thus increasing the strength and stability of these products. In those cases where the fusion temperature of the ordinary Vinyon copolymer is too high for such processing it is possible to supply a Vinyon with lower softening point. This is accomplished by spinning polyvinyl resins of slightly different ratio of vinyl chloride to vinyl acetate or by admixing plasticizers to the ordinary Vinyon before or after spinning.

In the other direction, development of a Vinyon resin having a much higher softening point than the resins now in use is well under way and has already met with considerable success. The heat sensitivity of the present fiber obviously excludes its use from fields where its shrinkage, softening, and fusion characteristics are undesirable. This disadvantage can now be said to have been overcome in the new resin.

One of the major outlets for Vinyon at the present time is in industrial fabrics, particularly filter cloths, where its strength and its inertness to water and chemicals are of great advantage (W. G. Luttge, Chem. Met. Eng., 48, 98, 1941). Successful applications of Vinyon are made wherever filtrations of strong acid or alkaline solutions are required, as in the production of titanium dioxide, phosphoric acid, in the removing of solid particles from concentrated sodium hydroxide solutions and in many other instances. Anode bags made from Vinyon are used effectively in electrolytic operations. Chemically resistant clothing for workmen is being tried. Bolting cloth used by the milling industry has been woven from Vinyon.

In the field of personal wearing apparel, veil material for hat trimmings is in demand. Women's gloves have been cut from a warp knitted Vinyon fabric. They are readily washable and are entirely shrink-proof when washed in tepid water. Investigation of numerous other such applications is under way.

Vinyon should find a large place for itself in the fields of sail cloth, cordage, fish lines, nets, etc., where its resistance to mildew and its high wet strength enable it to outlast many times the currently used materials. Again, its water repellency and high strength make it a valuable addition to the art of stringing tennis rackets, making tennis nets and providing strings for musical instruments.

The possible fields of usefulness of this new fiber have only been touched and it is expected that new uses will continually be developed which take advantage of the unique properties now available to accomplish effects which have, hitherto, been impossible.

Read the

American Dyestuff Reporter

for the latest information on textile printing and synthetic fibers.

PEROXIDE BLEACHING

A Report of Activity During the Past Two Years With Special Reference to Continuous Peroxide Bleaching

H. G. SMOLENS
Buffalo Electro-Chemical Co., Inc.

DURING the past two years or so, there has been little or no new development in the peroxide bleaching of wool, silk or rayon, but there have been a few developments in the technique of peroxide bleaching of cotton, due mainly to fairly large scale experimental work with the so-called "continuous bleaching" ranges of equipment. This work has been limited to a few types of fabrics in only a few finishing plants. However, it may possibly be claimed now, that the pattern of further developments along this line has been worked out.

The fundamental items involved in peroxide bleaching of textile materials are still the following: Peroxide concentration, total alkalinity, pH, temperature, time.

As has been pointed out several times during the past five years, the important factor underlying the entire subject of "continuous peroxide bleaching" is the discovery, made over ten years ago, that cotton can be bleached by saturating it with an alkaline peroxide solution and then allowing it to steep for a sufficient length of time for the desired bleaching to take place, i.e., originally, this "steep bleaching" with peroxide was performed at room temperatures, which requires considerable time, too long a time to make continuous operation practical. In some cases, a single steep bleach gives a satisfactory result; in other cases, a second steep bleach is necessary. Later it was found that the steeping time could be materially reduced by carrying out the steep bleach at higher than room temperatures. This is being done by heating the saturating solution, or by heating the cotton after it has been saturated, or by both. Still later, it was found that the most practical manner of steep bleaching, in the shortest possible steeping time. was to heat the cotton to temperatures around 212 Deg. F., after it had been properly saturated with the required peroxide bleaching solution. Steep bleaching at steam temperatures reduced this process time to the point at which continuous cloth handling equipment, such as the ordinary bleach house J box, could be used, and this process is being termed "continuous peroxide bleaching." All the above methods are still being used and will continue to hold preference in connection with bleaching under certain local conditions.

There are many ways of heating peroxide saturated cotton to the higher temperatures required in the so-called continuous peroxide bleach. Since it is desirable that the cotton does not dry out during the steep bleaching, the most convenient heating medium is direct steam. There are many possibilities in the method of application and the points at which it can be applied. A few of these, incorporating various ideas with respect to the steam application, have been tried out with a fair degree of success.

Among the several different continuous peroxide bleaching ranges, one applies the steam heat to the cloth after it has been saturated with the peroxide solution but before it has been piled into the J box for the steep bleaching. This range, in which the goods are subjected to the steam heating in an auxiliary piece of apparatus, represents what may be called a closed system. Another of the ranges now in operation, applies the steam heat to the cloth after it has been saturated with the peroxide solution and after it has been packed into the J box for the steep bleaching. This represents what may be called an open system, since the saturated cloth is plaited into the J box by apparatus which is not in direct contact with the steam and runs in full view of the operator.

It seems that in this "open system" of steep bleaching, the heating problem has been greatly simplified by the use of what may be called the mass heating principle, right in the J box itself, and since the heating time and the application of the steam heat can be adjusted fairly easily, uniformly reproducible results are obtainable.

There is now also in operation a continuous bleaching range for open width goods. This range may be classed as a closed system in which the peroxide saturated cloth is steam heated in the open width and then plaited down in an open width J box for the steep bleaching.

Continuous peroxide bleaching possesses one limitation, if it may be called such, in that it can be installed and operated with economy only in finishing plants where substantially large yardages of the same or nearly the same fabrics are being bleached.

The design of suitable steep bleaching J boxes for a bleachery contemplating the installation of continuous peroxide bleaching ranges involves the consideration of many factors. Among these are the weight, construction and quality of the goods to be bleached and the standards to be matched. The governing factor in continuous bleaching is the speed at which the goods can be run.

The following examples illustrate some of these factors. Let us assume that we are dealing with goods that should be run not faster than 100 yards per minute to avoid

fraying or pulling, and that we want a one hour steep bleaching time. A J box for eight yard goods would have to hold about 750 lbs. of cloth; for four yard goods, the J box would have to hold about 1,500 lbs. of cloth. Where goods to be steep bleached do not require any special handling precautions, they should be run at speeds which are accepted as normal operation. Thus, a four yard goods, run at 200 yards per minute and steep bleached for one hour, would require a J box holding 3,000 lbs.; and a wide sheeting run at 150 yards per minute and steep bleached for one hour, would require a J box holding 6,000 lbs. of cloth.

Routing of the goods is just as important in continuous peroxide bleaching as it is in peroxide batch bleaching. On work thus far done, there are two routings that have produced acceptable results. In one, the goods are saturated first with a scouring solution which may or may not contain peroxide, then steeped in a bin for from four to twelve hours, then washed, then saturated with a peroxide bleaching solution, then steamed in a J box for about one hour and finally washed to the white bin. In the other, the goods are saturated with a scouring solution which may or may not contain peroxide, then steam heated in a J box about one hour, then washed, then saturated with a peroxide bleaching solution, then steamed in a J box for about one hour and finally washed to the white bin. The use of either routing depends partly on the results desired and partly on local conditions at the bleachery. For instance, light weight fabrics for napping should not be double steam heated, as the filling yarns may get so hard and lifeless that they are difficult if not impossible to nap. In fact, all light weight or soft finish goods of any kind are probably of superior quality if given only one J box steam treatment.

It is thus seen that the design of a peroxide continuous bleaching range should be a matter of considerable thought and consideration before an installation is decided upon.

On the basis of work thus far done, it has been found that the overall cost of continuous peroxide bleaching is fairly reasonable and compares very favorably with the cost of conventional peroxide bleaching. It is to be expected that these costs will be reduced in the future.

During the past year there has been put into operation a new kind of bleaching process for cotton knit goods in which the goods are given so little pulling during the entire process that a definite shrinkage guarantee of finished garments seems possible. Due, also, to the minimum of handling and minimum of boiling, the bleached cloth is of superior softness and handle. In general, the knit cloth is saturated with a peroxide solution and plaited into a movable container which serves both as a steep bin and as a circulating kier. After bleaching and washing, this container of cloth is moved right up to a new type of continuous dryer, which dries the cloth without tension.

During the past two years, there has been in successful operation a new process for bleaching package yarn. In this process the yarn is saturated with a suitable peroxide bleaching solution, heated by direct steam for a comparatively short time, then washed and finished as usual. Not only is the production possibility of the package machine about doubled by the use of this process, but the chemical cost is materially reduced in comparison with that of the conventional method of package bleaching.

It is possible that within the next several years there will be a much wider use of "peroxide steam bleaching," "peroxide steep bleaching," and what may be correctly called "continuous peroxide bleaching." This extension in the use of the various processes, all of which have been thoroughly worked out chemically, will be mostly a matter of suitable equipment, most of which will probably have to be of original design and construction. Considerable thought and some work along this line have already resulted in some progress.

There has been a great deal of patent activity in relation to the new or improved processes in peroxide bleaching during the past few years. A thorough examination of patent literature should be of considerable value to those contemplating adoption of these newer processes.

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Finishing—

(Concluded from page 569)

whatever it is, the trend is plain as is evidenced by the rapid growth recently of specifications, not only by the government, but by consumers. I need only to point to the recent Wool Labeling Law, the growth of Factag and similar labels on all sorts of consumer goods. All this means more work for the textile chemist, both in checking old methods and devising new ones.

No summary of the old year is quite complete without a look towards the New Year, 1942. There can be no doubt synthetics will be even more important in textiles next year than this, both synthetic fibers and synthetic finishes. The only question seems to be which of the two will go ahead faster. A questionnaire sent to the leading chemical manufacturers of synthetic finishes revealed that every one of them planned to spend more time and money then ever before on research on their products, but naturally, each had a little different slant on what particular products would be most in demand. Forecasts for 1942's business varied from "very good" to "very gloomy." The former was based on the upward spiralling trend towards expansion; the latter, on the fact that shortages of raw materials might well get worse instead of better and also on the government's use of priorities to shut off civilian requirements for present textile finishes as being non-essential (see Defense Vol. 2, No. 32, 1941). Time alone will tell which prophecy is right! It is far more likely, however, that we shall all regard the future of synthetic finishes with less concern as we become more and more submerged in our own personal worries and problems as we are sucked into the maelstrom of active participation in war.

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American Association of Textile Chemists and Colorists

OCTOBER 27, 1941

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Members should notify the **Secretary** immediately of all address changes

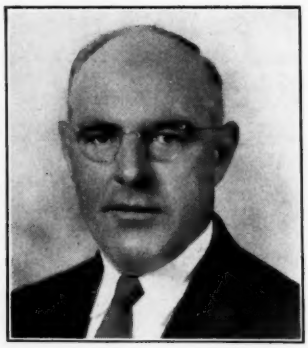
CALENDAR OF COMING EVENTS

Annual Meeting and Convention, Pinehurst, N. C., October 31st-November 1st, 1941.

Meeting, Northern New England Section, University Club, Boston, Mass., November 14, 1941.

Meeting, New York Section, Swiss Chalet, Rochelle Park, N. J., December 5, 1941.

Meeting, Southeastern Section, Atlanta, Ga., December 6, 1941.



A. R. Thompson, Jr.
Chairman, Publicity Committee

THE Publicity Committee for the Piedmont Section hopes that you have made plans and reservations to attend the 1941 convention at Pinehurst, and that you will benefit from the technical meetings and enjoy the sports program which has been arranged for you.

There were approximately 750 reservations made, up to Monday, October 13, which insures a great deal of enthusiasm for the Pinehurst meeting.

Approximately 250 registered for golf.

The official tennis tournament has been called off due to lack of sufficient entries. If you are interested in this phase of the program, however, bring your racquet, for there will be plenty of opportunity for you to enjoy this sport, although no prizes will be awarded or official tournament conducted.

Rooms at all of the Pinehurst hotels are completely taken, and unless you have hotel reservations confirmed, we doubt whether you will be able to get accommodations in any of the hotels nearby.

Looking forward to seeing you at Pinehurst and hoping that you enjoy the convention, we are

Yours very sincerely,

PUBLICITY COMMITTEE

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ANNUAL MEETING AND CONVENTION

OCTOBER 31-NOVEMBER 1—PINEHURST, N. C.

RESEARCH ACTIVITIES
of the A.A.T.C.C. for 1940-1941

LOUIS A. OLNEY
Chairman, Research Committee

THE Research Committee of the American Association of Textile Chemists and Colorists has continued to expand in membership and in its work of developing test methods and standards, particularly in the field of color. Several new Sub-Committees have been appointed to cover the following projects:

Fastness of Dyed Materials to Dry Cleaning;

Fastness of Dyed Materials to Chlorine; both under the Chairmanship of Charles A. Seibert.

Fastness to Washing of Dyed Rayon.

Shrinkage of Rayon in Washing and Dry Cleaning; Chairman, O. F. Marks.

A special Committee to Cooperate with the Government on the Improvement of the Fastness Properties of Uniform Fabrics; L. A. Olney, Chairman.

Physiological Effects of Textile Finishes; Kenneth Barnard, Chairman.

Several of the existing sub-committees have been reorganized and are actively engaged in work on their particular projects.

The Committee on Publicity, while not a sub-committee of the Research Committee, is closely allied in its work. A number of items have been prepared from time to time covering the work of various sub-committees, and have been distributed to a selected list of journals, thereby informing the industry of the valuable work being done by the A.A.T.C.C. A pamphlet was published, entitled "The American Association of Textile Chemists and Colorists—Its Aims, Accomplishments and Standard Test Methods" and distributed to a great number of Textile Manufacturers, Manufacturers of Textile Auxiliaries, Educational Institutions, Government Bureaus, Testing Laboratories, Consumer-Retailer Groups, and Better Business Bureaus. The widespread distribution of this pamphlet has created considerable interest in the work of our Research Committee.

The adoption of the A.A.T.C.C. Standard Tests for Fastness of Colored Textiles to Color Destroying Agencies by other groups such as the American Society for Testing Materials, The Division of Trade Standards of the U. S. Department of Commerce and the Federal Specifications Executive Committee are an indication of the value and widespread use of these test methods. Other organizations such as the Better Fabrics Testing Bureau, Official Testing Laboratory for the National Retail Dry Goods Association, Good Housekeeping Institute, Mail Order and Retail Store Testing Laboratories have also adopted many of the A.A.T.C.C. tests.

Since many of the A.A.T.C.C. Standard Methods have been adopted by organizations primarily in the consumer or distributing field as well as the producing groups, it was considered logical to submit them to the American Standards Association for approval as American Standards. At the present time the following Official A.A.T.C.C. Test Methods are under consideration by the A.S.A. for approval as American Standards.

1. Group C—Fastness Tests for Dyed or Printed Cotton.
2. Group S—Fastness Tests for Dyed or Printed Silk.
3. Group W—Fastness Tests for Dyed Wool.

A Sectional Committee made up of representatives of all groups involved, namely, Producers, Consumers, Distributors and General Interest, has been organized under the joint sponsorship of the A.A.T.C.C. and the A.S.T.M. This Sectional Committee Method for handling these as well as future submittals, was agreed upon as providing the best means for obtaining approval from the various groups involved. It was felt that joint sponsorship with the A.S.T.M. would promote cooperation between the two groups and also expedite the approval as American Standard, of the A.A.T.C.C. test methods. Other A.A.T.C.C. methods will be submitted to the A.S.A. as they become suitable for approval as American Standard.

The special committee to Cooperate with the Government on the Improvement of the Fastness Properties of Uniform Fabrics has been very active. This committee held its first meeting on July 8, 1941. At this time a group of dyes were selected to be used in various combinations in an effort to obtain better fastness to weather than that shown by O.D. Fabrics now being received by the Quartermaster Depot. Approximately one hundred and fifty special dyeings were prepared by several Textile Manufacturers and Dyestuff Producers and exposed to the weather for ten, twenty and thirty days at the Lowell Textile Institute under the direct supervision of B. A. Ryberg, Associate Director of Research for the A.A.T.C.C. A number of samples of dark and light serges submitted by the Quartermaster Depot were exposed at the same time. There are indications at this time that the O.D. Fabrics now being received by the Quartermaster Depot can be definitely improved in respect to weather fastness.

The Committee on Fastness to Light has been actively

studying the various new models and types of fading lamps. The FDA-R and FDA Fade-Ometers are being studied in an attempt to correlate their fading characteristics. The committee is also endeavoring to bring to completion the list of standards for fastness to light.

The Committee on Fastness to Rubbing (Crocking) has been collaborating with the Committee on Transference of Color in the development of a method for evaluating transference of color due to various causes. This method is based upon the use of Standard Munsell Greys and promises to provide a yardstick for measuring the amount of color transferred.

The Committee on Water Resistance of Fabrics has completely revised the methods for determining the water resistance of fabrics. It has drawn up tentative procedures for:

1. Hydrostatic Pressure Test.
2. Spray Test.
3. Immersion Test.

The Box Test has been dropped as an A.A.T.C.C. method and the larger form of Hydrostatic Pressure Tester formerly used, replaced by a new smaller form which offers better possibilities of controlling the temperature of the water which is important. The Spray Test was devised to simulate rain and provides a simple and convenient method for rapid, semi-quantitative control work. The immersion Test is designed to measure the resistance of the fibers in a fabric to the absorption and retention of water. The committee is now actively studying these methods with the object in mind of extending their usefulness and improving the technique of their application.

The Committee on Color has submitted its annual Bibliography of Color with Special Reference to Textiles and Dyes. It has continued its cooperation with the Inter-Society Color Council of which the A.A.T.C.C. is a member. Upon the recommendation of this committee the A.A.T.C.C. has officially approved of the I.S.C.C.-N.B.S. method of designating colors, as a standard method for the presentation of textile color data.

The Committee on Standard Methods for Determining Finishing Materials has completely revised the procedures dealing with Identification and Determination of Finishing Materials in Textile Fabrics. Newer types of finishing materials are included for the first time, such as Cationic softeners, Rosin, Glycerine and Glycols and Urea-Formaldehyde Resin.

The Committee on Fiber Analysis has completed and published the project entitled "The Sulfuric Acid and Aluminum Chloride Carbonization Methods for the Determination of Wool in Mixed Fabrics Compared in an Interlaboratory Study." This is a joint contribution of this sub-committee of the A.A.T.C.C. and sub-committee A-3, section 5, committee D-13 of the American Society for Testing Materials. The Associate Director of Research, B. A. Ryberg, collaborated with Lillian E. Weidenhammer of the U. S. Bureau of Home Economics and F. A. Prisley of the Hayward-Schuster Woolen Mills (A.S.T.M. Chairman) in preparing the data for publication in the AMERICAN DYESTUFF REPORTER for July 7, 1941.

The Committee on the Chemical Technology of Wool, through B. A. Ryberg, has published the results of the first part of the project on "The Development of Methods of Determining the Causes of Damage Appearing in Wool Cloth after Dyeing." It may be found in the October 28th, 1940, issue of the AMERICAN DYESTUFF REPORTER. The value of this work is evidenced by inquiries for reprints which have been received from Australia and Canada as well as the United States.

The Committee on Crease Resistance and Permanency of Finish has completed its project at the Massachusetts Institute of Technology. The Drape Meter developed in the course of this work is now undergoing trial in the industry.

The Committee on Fastness to Carbonizing of Dyed Wool has recently revised the method of test and has added standards for evaluation.

The joint committee of the A.A.T.C.C. and the A.S.T.M. on Fundamental Fiber Properties has compiled a table giving some of the constants for various fibers which will appear in the 1941 Year Book.

The Committee on the Analysis of Sulfonated Oils has become active again and has contributed the following: "Proposed Standard Method of Test for Organic Solvents Volatile with Steam in Sulfonated (Sulfated) Oils."

The Committee on Bibliography again has contributed its annual bibliography of articles of special interest to our members. The list of journals covered has been considerably enlarged as well as the personnel of the committee.

The Committee on Resistance of Yarns and Fabrics to Insect Pests (Moths) has cooperated with similar committees from the A.S.T.M. and the N.A.I.D.M. (Insecticide Manufacturers) in revising the present tentative test for Resistance to Insect Pests. A standard fabric has been selected for use in developing the test and a number of cooperating laboratories are carrying on tests which will form the basis upon which revisions are to be made.

The Committee on Atmospheric Fading of Dyed Acetate Rayon has been extremely active due to the increased recognition of this condition by consumer groups. A great deal of work has been done in determining the cause of this fading, factors influencing the degree of fading, development of suitable test apparatus and correlation of various types of test apparatus now in use. Inhibitors have been investigated but it is felt that they do not solve the basic problem.

A tentative method of test has been developed and was published in the AMERICAN DYESTUFF REPORTER, December 23, page 704, 1940.

The Committee on Fastness of Dyed Materials to Dry Cleaning is well under way on their project. Questionnaires have been sent out to the industry in order to obtain

(Concluded on page P600)

Annual Meeting and Convention

T. W. Church, Jr.
Chairman, Finance Committee

The success of the 1941 A.A.T.C.C. Convention in Pinehurst will be credited in a large measure to the efficient work and planning of the Finance Committee, headed by T. W. Church, Jr., Chairman. Mr. Church is Secretary of Highland Park Manufacturing Company, and is also Vice-Chairman of the Piedmont Section and the nominee for Chairman for next year. He is assisted by the following members of the Finance Committee:

H. E. Kiefer, Jr.—Ware Shoals Mfg. Company.

George A. Howell, Jr.—Rock Hill Printing & Finishing Co.

T. R. Smith—Wiscassett Mills.

Francis E. Stewart—Piedmont Processing Company.

Richard M. Mitchell—Proximity Mfg. Company.

John B. Neely—Burlington Mills Corporation.

The work done by the Finance Committee with the cooperation of the members and friends of the Piedmont Section makes possible many beautiful and useful prizes for the various sports events and for a first class entertainment Friday night. The Piedmont Section is endeavoring to make the 1941 convention in Pinehurst a most enjoyable and profitable event for you.

NOTE: The above photograph of Mr. Church was taken some time before his appointment as Chairman of the Finance Committee.

October 31st—November 1st
The Carolina, Pinehurst, N. C.

CREPE de CHINE HOSIERY*

B. L. HATHORNE and R. W. SEEM

Inasmuch as the use of silk in hosiery has more or less become a thing of the past since this paper was presented, the authors have added at the end a number of remarks concerning the use of "Ray de Chine" yarn in hosiery. "Ray de Chine" is ordinary rayon processed into yarn in a manner very similar to Crepe de Chine.

CREPE de Chine hosiery is hosiery made from high twist, one way twist crepe yarn. High twist one way twist crepe yarns have long been used in the weaving industry. For example, in Crepe de Chine woven fabrics, with which we are all familiar. High twist, one way twist crepe yarns eminently suitable for weaving could not be used in knitting because they kinked on the machines and creped excessively during boil off and dyeing.

Crepe de Chine hosiery yarns are so processed that they not only will not kink during knitting but knit better than many of the conventional twists. They do not crepe excessively during boil-off or dyeing, but instead remain tightly twisted and produce a fabric more sheer, more dull, and more snag resistant than fabrics made from conventional yarns produced heretofore.

The first silk yarns to be used in hosiery were of course heavy thread low twist tram yarns, such as 10 thread 3 turns, etc.

As the finer gauge machines came in and as stockings were made from fewer and fewer threads higher twists were used. For example, in 3 thread it was found possible to knit 3 thread 30 and 3 thread 35 turn yarn successfully. Attempts to go beyond this point were not commercially successful, so the industry turned to the compensated yarns of the grenadine and compensene types, with which you are of course familiar.

I will undertake to show you in two different ways the differences between compensene, grenadine and Crepe de Chine insofar as the twist actually in the yarn as knit into the stocking is concerned.

I have here two pieces of rubber hose, each with a stripe running throughout its length. The purpose of these stripes is to enable me to demonstrate visually to you what happens when yarns are twisted in one direction, doubled and then twisted in the reverse direction, and what happens when a plurality of threads are twisted in the same direction.

I will first make a grenadine type construction. Let us assume that this length of hose is a single end of silk. We will twist it 10 turns (10 turns twist inserted).

Now let us put 10 turns of yarn into another single end—(10 turns twist inserted).

In the making of a grenadine, yarns twisted in one direction in the single end are doubled and are then twisted a number of turns in the opposite direction. We will double these yarns and then twist 10 turns in the opposite direction (both tubes twisted 10 turns together).

You will note that the lines painted on the hose are now straight. In other words all of the initial twist or single twist put in this yarn has been removed by the ply twist. Thirty turns of inserted twist, 10 in each single end and 10 in the ply have resulted in only 10 turns actually present in the finished yarn—the ply twist only. (Ply twist removed as a demonstration).

As I pointed out, the reason for doing this commercially is to balance the yarns in order that they may be successfully knit.

Now let us try a compensene. Compensene is yarn produced by plying one or more twisted single ends and one or more single ends with no twist in a direction opposite to the initial or single end twist.

As an illustration we will insert 10 turns of twist in one single end (twist inserted), and will then double it with an end of no twist yarn. You will note that twist has been inserted in the hose with the red stripe and the hose with the yellow stripe is untwisted. Now let us twist in the reverse direction and see what happens (10 turns inserted in reverse direction).

You will note that the twist has been removed from the red end and twist has been inserted in the yellow end. In this instance we have inserted 20 turns of twist and we have 20 turns in the finished yarn—10 turns in the ply and 10 turns in the yellow single end. Note that the red end now shows *no* twist and twist has been inserted in the yellow end.

We will now make a Crepe de Chine yarn. We will ply two ends of yarn and twist them 10 turns. You can see from the stripes on the hose that there is twist in the ply and also twist in each single end. I will now remove the ply twist (ply twist removed without disturbing single end twist).

You will note that each of the single ends contains 10 turns of twist which I will now proceed to remove. (Twist removed from single ends).

In this instance 10 turns of inserted twist has produced 30 turns of twist in the final yarn.

To review what this demonstration has shown, in the first instance—in the grenadine type construction 30 inserted turns produced 10 turns in the final yarn. In the second demonstration compensene 20 turns of inserted

*Presented at meeting, Piedmont Section, April 19, 1941.

twist produced 20 turns in the yarn when completed. In the third or Crepe de Chine demonstration 10 turns of inserted twist produced 30 turns in the final yarn. This high twist produces the extra sheerness, dullness and snag resistance in Crepe de Chine hosiery.

As I stated at the outset high twist one way twist yarns have been successfully used in weaving for many years. The Crepe de Chine hosiery yarns differ from Crepe de Chine weaving yarns used heretofore in that they have been so processed during yarn manufacture that the twist is relatively dormant, thus enabling the yarns to knit free from kinks and to finish without excessive crepeness in the stocking, and are so processed that when the hose are dry the seam is relatively straight.

* * * *

The striped hose demonstration clearly illustrates what happens when yarns are twisted in one direction and then another and that conclusively prove that when a plurality of threads are twisted in the same direction an equal number of turns of twist is imparted to each single end and to the ply. The tubes however do not show what happens to the diameter of threads when they are twisted a substantial number of turns per inch. If we had a sufficient number of individual tubes, and if these tubes were slightly irregular throughout their length and were slightly bent here and there away from a completely parallel position we could make a complete demonstration with the rubber hose. If however we had a sufficient number of these tubes to equal the number of filaments in a 3 thread silk yarn it would be difficult to show the effect of twisting on the number of turns, because each individual filament is also twisted on its own axis as twist is applied to the yarns and to the plys.

I have therefore prepared some cotton tubing to illustrate what happens to the diameter and to the general appearance of yarns twisted in various manners.

I have calculated the relationship between silk yarns and these "magnified yarns" so that the twists I impart will be directly in proportion to the twists used in preparing hosiery yarns for knitting.

I will first prepare a yarn directly comparable to 3 thread 25 turns silk yarn. (Demonstration made).

We will next make a yarn comparable with 3 thread 50 turn yarn, otherwise known as 3 thread 200 turns Crepe de Chine. Naturally this will require twice as many turns. You will note that this added twist produces an appreciable shortening in length and reduces the diameter appreciably. (Demonstration made).

I will now demonstrate for you a hosiery crepe yarn known as 180 turn yarn. This yarn is made by inserting 40 turns in each single end and then reversing the doubled ends 60 turns. It required 180 inserted turns to make this yarn. As delivered the yarn contains 120 turns —the 60 turns in the ply and 20 turns in each single end. This yarn is a most excellent yarn and makes very fine stockings. You will note however that instead of the smooth compact appearance of Crepe de Chine the yarn gives a corded appearance, that increases its apparent diameter and makes it at least somewhat more susceptible to snagging. (Demonstration made).

We will now untwist this 180 turn crepe and will make a minimum or 20 turn crepe. This is a much more common construction and is designed primarily to meet the minimum crepe construction requirements. In other words it is the cheapest yarn to produce that can be sold as crepe. It is made by inserting 15 turns in each single end and then plying 35 turns. Thus it requires 80 inserted turns to produce, and contains 95 final turns when finished. (Demonstration made).

You will note that this yarn has almost the same diameter as the 3 thread 25 turn yarn which should be expected—95 turns should not be expected to produce a yarn finer in diameter than 100 turns, and 3 thread 25 turn yarn contains 100 turns as delivered, 25 turns in each single end and 25 turns in the ply.

I think this demonstration clearly shows the diameter relationships of one way twist high twist yarns as compared with one way twist low twist yarns and as compared with the conventional type of yarns known in the hosiery industry as crepe yarns.

* * * *

With respect to the dyeing and finishing of hosiery knit from Crepe de Chine yarn, there are only two items that I feel it necessary to call to your attention.

Due to the high twist the stocking naturally boils off a little slower and this should be taken into account.

Due to the high twist in the yarn, if improperly handled the stocking can develop a twist or bulge in the ankle. To prevent ankle twist the following should be borne in mind.

1—The design of the stocking is important. When narrow ankle boards must be used there is more danger of ankle twist because pulling over the heel disturbs the set of the ankle. This can be and should be overcome by adding a few more stitches at the ankle than is usual when conventional types of yarns are used.

2—The hose should also be properly constructed with respect to courses. When too sleazy a construction is used trouble can be anticipated.

3—The various firms engaged in the manufacture and distribution and servicing of chemicals to the hosiery finishing field have available finishes especially designed to correct ankle twist, and all of these firms can supply the proper materials.

4—The technic of boarding is especially important. The stocking should be pulled over the form, given a sharp tug just below the ankle and then boarded in the usual way. This sharp tug at the ankle helps to set the ankle and goes a long way towards preventing any ankle twist.

Most of the firms now engaged in the knitting of Crepe de Chine hosiery have overcome such ankle twist and construction problems as they originally encountered. Through co-operation with the merchandisers of finish I am sure that the balance will soon liquidate any difficulties they may have encountered in this respect.

A simple explanation of the physics involved may be of some interest. The twist is caused by the yarn returning to its normal or dry condition so fast during boarding that the latent forces in the yarn do not have time to properly adjust themselves. It would be overcome by boarding cooler, by boarding slower, or by boarding in a room with a normal or slightly excessive humidity rather than in a relatively dry room as most boarding rooms of necessity are. All these possible means of preventing the twist are not feasible for various reasons that need no further discussion here. The proper way to prevent ankle twist is by starting with the proper construction, by using the proper finishing materials that are available from your regular sources of supply, and by following the proper technique during the boarding operation.

* * * *

RAY DE CHINE

Ray de Chine is ordinary rayon processed into Ray de Chine yarn in a manner very similar to Crepe de Chine, and knit into hosiery under the Ray de Chine quality control plan.

Crepe de Chine improved silk appreciably. Crepe de Chine hose are more sheer, more snag resistant and wear substantially longer than ordinary silk hose.

Ray de Chine improves rayon much more than Crepe de Chine improved silk. Ray de Chine yarns are not only more sheer, more snag resistant, and produce hose that wear longer than ordinary rayon but in addition the Ray de Chine treatment has, to all intents and purposes, overcome the defect of all previous rayon hosiery—bagginess.

There are three sound technical reasons why Ray de Chine hose do not bag.

First, the processing removes a substantial part of the elongation of rayon that might normally be considered plastic flow. When rayon is stretched continuously until it breaks, part of the stretch that takes place is plastic flow (that is, there is little or no tendency for this part of the total elongation to recover if the strain is removed before the breaking point is reached) and part of the elongation is structural stretch. The Ray de Chine process reduces the residual elongation of the yarn and at the same time removes a substantial part of the elongation that does not add elasticity to the yarn. Thus, when this stretched yarn is further subjected to strain, it shows a substantially increased elasticity. The Ray de Chine process does not actually put elasticity into the yarn, it merely allows more of the elasticity that is there to be utilized.

A second reason why Ray de Chine hose are more elastic is the physical form in which the yarn is twisted. An iron wire does not show elasticity when it is strained by hand. This same wire, however, when twisted into a spiral shows decided recoverability properties. For example, consider a coiled wire spiral used to close an ordinary household screen door. The high twist of Ray de Chine necessarily imparts some elasticity to the yarn due to its coiled structure.

A third factor that imparts resiliency to Ray de Chine is that the higher twist yarn when bent into a loop obviously must try to straighten itself out because the filaments on the inside of the loop are compressed somewhat and push against themselves, thus tending to straighten out the loop and imparting true elasticity to the knitted fabric.

Careful consideration of the above will convince anyone that there are three separate and distinct factors, each of which impart added resiliency to Ray de Chine hose.

From the dyeing viewpoint there are at the moment no particular problems. Dyers have already processed many million pounds of rayon hose and the processing of Ray de Chine hose, at this time, differs little from the processing of ordinary rayon hose. The difference is only in finishing. As the yarn is highly twisted the yarn obviously must be hard and firm to the hand and this of course must be taken into account by the dyer in applying the finish. Ray de Chine's must be finished softer than ordinary rayons.

It is to be expected that cooperation between dyers and the throwsters and knitters will produce Ray de Chine hose substantially superior to those already available because special boil-off procedures will enable the use of still higher twists without producing a crepe effect in the finished hose. At this time Ray de Chine twists are 35 turns for 100 denier, 40 turns for 75 denier and 45 and 50 turns for 50 denier. The only reason that higher twists have not been utilized is that above these twists there is a tendency for the yarn to crepe during boil-off, thus disturbing the wale line structure of the hose, producing an uneven result. Entering the hose into cold water and soaking and then raising the temperature slowly, and other obvious methods of processing that dyers are familiar with, will enable higher and higher twists to be utilized, thus producing better and better hose.

Complete reports of all meetings, papers presented and discussions at the Annual Meeting will appear in future issues.

Annual Meeting and Convention

Douglas C. Newman
Chairman, Speakers Committee

Hon. Clyde R. Hoey

D. C. NEWMAN, E. I. DuPont de Nemours & Company, Chairman of the Speakers Committee, assisted by Charles H. Stone, American Cyanamid & Chemical Corp., and John L. Crist, Southern Dyestuff Corp., announces that the Speakers Committee has been most fortunate in securing Honorable Clyde R. Hoey, former Governor of the State of North Carolina, as guest speaker for our banquet on Saturday evening, the first of November. Governor Hoey is recognized as being one of the foremost orators in America. His home is in Shelby, in the heart of the cotton growing and cotton manufacturing section of the state, so he has ample first hand knowledge of the southern textile industry.

As a statesman of national renown, he will bring to our meeting a message of first importance, an event to look forward to with keen anticipation.

October 31st - November 1st

The Carolina, Pinehurst, N. C.

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President

ROLAND E. DERBY
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Chairman
Technical Program Committee

ANNUAL MEETING

Program

Twenty-First Annual Meeting

The Carolina, Pinehurst, N. C., October 31-November 1, 1941

FRIDAY, OCTOBER 31, 1941

9:00 A.M. Registration Opens at the Carolina and will continue open until banquet time Saturday night.

9:30 A.M. Council Meeting (135th).

11:00 A.M. Research Committee Meeting (128th).

Intersectional Contest, Grand Ballroom, The Carolina

2:00 P.M. Introductory remarks by Dr. CARL Z. DRAVES, *President,* and DR. L. A. OLNEY, *Chairman of the Research Committee and "Chief Justice".*

2:10 P.M. "Progress Report on the Preparation and Processing of Domestic Flax". Southeastern Section, P. N. COLLIER, *Vice-President and Research Director, Callaway Mills, LaGrange, Ga.*

2:30 P.M. "Evaluation of Finishing Agents for Sanforizing". South Central Section, ANDREW J. KELLY, *Production Manager, Burkart-Schier Chemical Co., Chattanooga, Tenn.*

2:50 P.M. "Testing Vat Dyed Cotton for Fastness to Hypochlorite Bleach". Philadelphia Section, CHARLES A. SEIBERT, *E. I. duPont de Nemours and Co., Wilmington, Del.*

3:10 P.M. "Cotton Fabric Construction in Relation to Water Resistance". New York Section, P. J. WOOD, *Royce Chemical Company, Carlton Hill, N. J.*

3:30 P.M. INTERMISSION.

3:40 P.M. "Textile Chemists Meet National Defense Emergency". Rhode Island Section, THOMAS H. ROBERTS, *Vice-President Arnold Hoffman and Company, Providence, R. I.*

4:00 P.M. "Relative Exhaustion of Vat Colors in the Pad Pigment Method of Jig Dyeing". Piedmont Section, C. NORRIS RABOLD, *Chief Chemist Union Bleachery, Greenville, S. C.*

4:20-4:40 P.M. "The Prediction and Control of Colored Blends by Optical Means". Northern New England Section, DR. SEIBERT Q. DUNTLEY, *Massachusetts Institute of Technology, Cambridge, Mass.*

5:00 P.M. ANNUAL BUSINESS MEETING in Grand Ballroom.

8:30 P.M. Stage Show—Carolina Theatre. Admission by ticket only, secured at A.A.T.C.C. registration desk in The Carolina.

Auspices of:

Piedmont Section

GAND CONVENTION

SATURDAY, NOVEMBER 1, 1941

Session on "Textiles and National Defense"—Dr. Carl Z. Draves, President, A.A.T.C.C., presiding. Grand Ballroom, The Carolina

9:30 A.M. "1941 in the Dyestuff Industry" by ALBERT E. SAMPSON, *National Aniline and Chemical Company.*

9:50 A.M. "The Chemical Manufacturer and the National Emergency" by DR. D. H. POWERS, *Rohm and Haas Company.*

10:10 A.M. "Defense Problems from the Mill Man's Viewpoint" by WINN W. CHASE, *Associate Editor, Textile World.*

10:30 A.M. "Purchase and Inspection of Textiles for the Army" by LIEUT. COLONEL VERE PAINTER, *U. S. Army, Philadelphia Quartermaster Corp., War Department.*

10:50 A.M. INTERMISSION.

11:00 A.M. "Textiles from the Navy Standpoint" by LIEUT. R. G. BUCK, SC., *U. S. Navy, Naval Clothing Depot, Brooklyn, N. Y.*

11:20 A.M.-11:50 A.M. "Production of Wools of Unusual Properties Through Modification of Their Chemical Structures" by DR. MILTON HARRIS, *Director of Research for the Textile Foundation at the National Bureau of Standards.*

Session on Hosiery—Mr. T. R. Smith, Vice-President, A.A.T.C.C., presiding. Card Room—The Carolina

9:30 A.M. "The Dyeing of Army Socks" by S. M. HAMILTON, *Holeproof Hosiery Company.*

9:50 A.M. "The Throwster Serves the Silk Hosiery Industry Without Silk" by GEORGE URLAUB, *Textile Consultant.*

10:10 A.M. "The Dyeing of Nylon Hosiery" by P. H. STOTT, *Technical Laboratory, E. I. duPont de Nemours and Company.*

10:30 A.M. "The Manufacturing of Full Fashioned Hosiery in Relation to the Finish" by JOSEPH KELLY, *May Hosiery Mills.*

10:50 A.M. INTERMISSION.

11:00 A.M. "The Dyeing and Finishing of Full Fashioned Hosiery" by VIRGIL T. HARTQUIST, *Wayne Knitting Mills.*

11:20 A.M.-11:40 A.M. "The Hosiery Situation Today and Outlook for Tomorrow" by EARL CONSTANTINE, *President, National Association of Hosiery Manufacturers.*

Light Fading Clinic—Dr. Carl Z. Draves, President, A.A.T.C.C., presiding. Grand Ballroom—The Carolina

12:00 Noon "Fundamental Concepts in Fade-Ometer Design and Operation" by E. H. HARVEY, *Atlas Electric Devices Company.*

12:15 P.M. "The 'National' Accelerated Fading Unit" by C. G. OLLINGER, *National Carbon Company, Inc.*

12:30 P.M.-1:45 P.M. "Action of Accelerated Fade Tests on the Color of Wool Fabrics" by J. J. GLENN, *Sidney Blumenthal Company, Inc.*

1:00 P.M. Luncheon for Officers of the Association and its Sections—Crystal Dining Room.

1:30 P.M. Golf Tournament—Members and Guests. Tennis and Horseback riding available to all interested.

2:30 P.M. Skeet Tournament—Pinehurst Gun Club.

3:00 P.M. 5:00 P.M. Ladies Bridge Party—West Lobby—The Carolina.

8:00 P.M. BANQUET—The Carolina. (Dress Optional). Admission by ticket only, secured at the A.A.T.C.C. registration desk in The Carolina.
Toastmaster: D. C. NEWMAN.
Speakers: CARL Z. DRAVES, *President of the Association;* WILLIAM M. MCLAURINE, *Secretary and Treasurer, American Cotton Manufacturers Association;* HON. CLYDE R. HOEY, *formerly Governor of the State of North Carolina.*

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The Carolina

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President Emeritus
Chairman of Research Committee

THOMAS R. SMITH
Vice-President

HAROLD C. CHAPIN
Secretary

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ABSTRACTS

of Papers to Be Presented at Annual Meeting

Pinehurst, N. C.—October 31st and November 1st

INTERSECTIONAL CONTEST

The Prediction and Control of Colored Fiber Blends by Optical Means

To be presented by Dr. Seibert Q. Duntley
For the Northern New England Section

THE blending of colored fibers to match a given standard has been attended with considerable difficulty, and results in most cases have been as good as trial and error methods will permit. Now modern colorimetry has come to the assistance of the colored-fiber blender with an entirely objective method by which it is possible to determine, first, whether available fibers can be used to match the shade, and secondly, the proportion of each required to secure the match. The number of components to produce a given shade can theoretically be unlimited, but the minimum number of batches required for any given case is readily determined. The method requires the availability of a colorimeter or spectrophotometer. The Tristimulus coefficients obtained therewith for both the standard and the components are plotted on tridimensional Cartesian coordinates. This, supplemented by simple calculation, determines the two questions of suitability and proportion. Examples are given of the application of this method to both civilian and military requirements.

Based on original work by Dr. Seibert Q. Duntley and Mr. Frank J. O'Neill, of the Massachusetts Institute of Technology, and prepared for presentation with the cooperation of the local committee.

The Textile Chemist Meets National Defense Emergency

To be presented by Thomas H. Roberts
For the Rhode Island Section

THIS paper will discuss the question of shortages of various types of materials used in textile processing and some of the methods and products which have been developed to overcome same. Included in the materials that will be discussed will be the following:

Starches, Gums, and Dextrines
Natural Gums
Oils, Fats and Waxes
Miscellaneous Chemicals
and Textile Materials

Cotton Fabric Constructions in Relation to Water Resistance

To be presented by P. J. Wood
For the New York Section

THE influence of fabric construction on the results obtained when cloth is processed to obtain water resistance is an important factor which has not been thoroughly investigated. The increasing demand, especially for military and service use, of various types of water-resistant fabrics, necessitates a knowledge of the fundamental factors which determine success or failure in the proper selection of constructions best adapted for specific uses. Indiscriminate treatment for repellency of fabrics which may not be suitable at all for certain uses, especially from a construction viewpoint, is a questionable practice.

The cooperative research undertaken involves a study of more than 50 constructions of treated cotton fabrics (mill processed specially under controlled conditions throughout) at present found in the water-resistant cloth market, from the viewpoint of construction and water-resistance when subjected to various types of water-resistance tests. The constructions include twills, poplins, gabardines, broadcloths, etc. It is hoped that the data obtained may be of value to all concerned in the production of water-resistant fabrics.

Testing Vat Dyed Cotton for Fastness to Hypochlorite Bleach

To be presented by Charles A. Seibert
For the Philadelphia Section

SATISFACTORILY consistent reproducibility requires more careful control than heretofore described in test procedure in respect to liquor volume ratio, pH, temperature during testing, removal of residual chlorine remaining in the tested specimens and in the temperature and conditions of drying after completion of testing. Proper selection of buffers permits the required control of pH of a large number, if not all of the hypochlorite solutions now available in the form of trade named washing compounds for home laundry use. Rinsing in cold water will not readily remove residual chlorine, especially from fabrics treated to impart water repellency. Rinsing in hot water may, but may also cause a further action of the remaining chlorine. All substances recommended and in use for the removal of residual chlorine may not be equally suitable for test purposes, because they exert

some influence on the degree of color change effected in testing.

Relative Exhaustion of Vat Colors in the Pad Pigment Method of Jig Dyeing

To be presented by C. Norris Rabold
For the Piedmont Section

I. Object of paper.
Study of exhaustion rates of various vat combinations for a considerable period of time has led the writer to believe that more attention given this phase of vat dyeing would prove profitable to all plants. Consideration of exhaustive rates when setting up dye combinations has resulted in the following benefits:
A. Better matching of shades.
B. Virtual elimination of end to end taper.
C. Decrease in yardage rehandled with corresponding decrease in cost and increase in production.

II. Detailed description of our method of running exhaustion tests.
A. Function of the laboratory as service unit for the dye house.
B. Description of the close correlation between the exhaustion tests as run in the laboratory and the tie-in with jig patches so that actual prediction can be made from laboratory tests as to how the combination will exhaust on the jig.

III. A detailed evaluation of various vat colors as to their rate of exhaustion.
A. Effect of temperature on rate of exhaustion.
B. Effect of color concentration on rate of exhaustion.
C. Effect of "washing-off" of color when going into reduction.
D. Effect of time factor of color development when going into reduction.

IV. Examples of poor exhausting combinations and corrective methods applied.

V. Recommendations as to selecting colors according to their exhaustion rates.

Progress Report on the Processing and Utilization of Domestic Flax

To be presented by P. N. Collier
For the Southeastern Section

A SYSTEMATIC study of the adaptability of the flax plant to the soil and climatic conditions in the South has been conducted. In an effort to create a market for this farm product and to provide the cotton textile industry with domestic flax fiber, the processing of flax straw into a stapled fiber suitable for working on cotton mill equipment and for blending with cotton in textile products has been extensively investigated.

The flax straw is stapled in an especially adapted stapling machine, passed through a decorticating machine designed for the purpose, and dusted. The resultant fiber is degummed in a kier at 160° C., with an alkaline solution. The degummed fiber is thoroughly washed and dried in especially designed equipment and is ready for processing on cotton textile machinery.

Preliminary tests indicate that the fiber can be easily worked on cotton equipment and that its blends with cotton afford interesting novelty effects.

This has been a co-operative project with the Tennessee Valley Authority.

Evaluation of Finishing Agents for Sanforizing

To be presented by Andrew J. Kelly
For the South Central Section

THE finishing of textile fabrics scheduled for sanforizing usually predicates a type of wetting peculiar to shrink-proofing operations. Ordinarily, surface-active agents are dissolved in water to form a solution which must provide adequate wetting to textiles entered therein. The auxiliary products here considered are applied in similar fashion but it is the subsequent effect, after the goods are dried, which is of prime importance. The textiles so processed must manifest the property of rapidly and uniformly absorbing moisture when the *dry* fabrics are subjected to an aqueous spray. This operation is known variously as re-wetting, wetting-back, or secondary wetting. In spite of the immense yardage of goods sanforized, there is no standard method for the evaluation of auxiliaries applied for this purpose.

A review of the test methods used by practical mill operators was made; and the effect of such factors as composition of finishing bath, handling of test fabric, temperature of the rewetting liquor, etc., carefully considered. A modification of the Canvas Disc Wetting Test was evolved which it is believed offers at least the basis of a practical method for the evaluation of the secondary wetting properties of a textile auxiliary.

TEXTILES AND NATIONAL DEFENSE

The 1941 Dyestuff Industry

By Albert E. Sampson
National Aniline and Chemical Co.

FOR a quarter of a century the Dyestuff Industry of America has been preparing to fulfill an essential and a patriotic duty. Normal domestic needs have been met and the development of new products has proceeded most satisfactorily. Too few laymen appreciate the dependence of our National well being and our National Defense, upon the efficient production of the various coal-tar derivatives, synthetics, intermediates and dyes. Here, are consumed the by-products of America's vast iron and steel industries. These create the essentials for "critical" military explosives, poison gas, rubber, resins, solvents, medicinals and other vital purposes. Thus, it is possible to make the dyes that meet the exacting specifications of our Army, Navy, Marine and Aviation units, and the wide variety to serve the needs of a critical public. They decide to a considerable degree the success or the failure of a nation in a National Emergency.

Our emergency is now here. Governmental contracts are at an all record high. Domestic needs have soared. Troublesome days are ahead. We must be patient, appreciative and above all, calm and cooperative. The Dyestuff Industry of America pledges itself to "KEEP 'EM DYEING."

The Chemical Manufacturer and the National Emergency

By Dr. D. H. Powers
Rohm and Haas Co.

THE major problem of the chemical manufacturer today is one of *production*. In the first World War the chemical industry was small and relatively unimportant. Today it is a vital part of the economic and industrial life and essential to the defense of the country. The chemical industry can take care of the great majority of the normal civilian needs, but today it is caring first for defense needs which are steadily growing and then supplying as much as possible the materials necessary to keep running the more important and more essential civilian processes.

With the increasing demand of chemicals for defense and civilian needs the second major problem of the chemical industry is *shortage* and *substitution*. The chemical industry has been quick to turn every resource to the development of new materials to take the place of the products which are becoming short and scarce because of defense requirements. Many unusual substitutes are appearing out of the research laboratories to replace and supplement the shortages of fibers, chemicals and materials. Many of the substitutes which are now considered temporary replacements will become staples in a few years. Consider the substitutes that are being developed for silk, wool, jute, burlap, linen, china cotton, rubber, chlorine and even alcohol. New shortages and new developments appear almost daily.

The chemical industry supports more *research* than any other industry and at a time like this the products of the research laboratory find quickest adoption. We read daily of the new types of fabrics which are being taken in millions of yards—types which did not exist a year or two ago. We can expect new fabrics and materials to appear in increasing numbers as the shortage of materials increases. Here at least are cases where scarcity encourages research.

The chemical manufacturer is meeting the emergency by increasing his production to its limit. He is developing new processes and new products for defense needs and for civilian use to fill in the severe shortage of fibers and fabrics. If it were not for the tremendous defense needs, civilian plants would not feel and scarcely notice the withdrawal of the imported chemicals and materials which a few years ago we considered essential to our industry.

Defense Problems from the Mill Man's Viewpoint

By Winn W. Chase
Associate Editor, Textile World

THE task of the textile manufacturer today is to supply the Government with all textiles needed by the Army and Navy and at the same time to meet all essential civilian requirements. The defense program has given rise to many problems. Some of these are beyond the control of individual textile manufacturers or of the industry as a whole. Other problems are capable of partial solution at least by efforts of individual companies and by concerted action of groups of companies in the several branches of the industry. From the standpoint of the mill man, the most serious problems at present are due to shortages of many of the materials entering into the manufacture of finished textiles. Because of these shortages it is necessary to conserve and to substitute. The order issued on July 26 freezing all stocks of raw silk in the United States "to meet a threatened shortage caused by unsettled conditions in the Far East" was the most severe restriction imposed up to that time on any branch of American business as a result of the defense program. Shortages of many metals essential to the defense program and setting up of the priorities system has brought other problems to the textile mills. For example, it is practically impossible to obtain equipment made from stainless steel, Monel metal, aluminum, etc., unless it is needed to permit the fulfillment of defense contracts. There are serious shortages of many of the chemicals used in textile processing. Olive oil, formaldehyde, acetic acid, and chlorine are just a few of the chemicals which are scarce and for which substitutes must be found if the mills are to continue to turn out sufficient quantities of textiles of satisfactory quality to meet all requirements. Shortages of skilled labor, fuel, and power add to the problems with which the mill man must cope.

Purchase and Inspection of Textiles for the Army

By Vere Painter
Lieut. Colonel, Q.M.C., U. S. Army

THE Philadelphia Quartermaster Depot, has within the past year become the world's largest purchaser of textiles, having purchased at least ninety (90) per cent of all textiles required for National Defense purposes.

Purchases during the past fiscal year amounted to twenty-five times the amount purchased during the preceding year. This tremendous increase in volume of business has produced many and varied problems and inevitable bottlenecks. However, handling the procurement of large quantities of textiles was nothing new to the Philadelphia Depot and a tremendous load has been handled by merely expanding existing facilities in accordance with plans prepared long in advance of the emergency and carrying on the job in the same manner as has been done in the past.

Lieut. Colonel Vere Painter, Officer in Charge of

Inspection and Senior Textile Technologist at the Philadelphia Depot, will discuss the many problems connected with planning to meet the present emergency difficulties encountered, methods used in breaking the inevitable bottlenecks and the textile outlook for the immediate future.

Textiles from the Navy Standpoint

By LIEUTENANT R. G. BUCK
U. S. Navy

IT has been truthfully said that the enlisted men in the United States Navy are the best dressed sailors in the world. It is our job to keep them so uniformed.

We, at the Naval Clothing Depot, use nearly 150 Navy Department Specifications and 50 Federal Specifications in the procurement of textiles, textile trimmings, and clothing. These specifications are for the mutual benefit of the government and supplier. A bidder knows exactly what he is bidding on and what he will be required to furnish, in competition with other potential suppliers.

Specifications are drafted, changed, and revised only after extensive tests. Inasmuch as we have but very little funds available for experimental purposes, we must depend to a great extent upon the generosity of the manufacturers and suppliers to do most of our experimental work. In this, we work together until we get the best solution to our problems, which includes a wide field of supply under competitive bidding.

We do not specify the kind of dye to be used in dyeing our textiles. We may at times specify the type of dye to be used or that sulfur dye is not permitted, because we have found it practicable.

Production of Wools of Unusual Properties Through Modification of Their Chemical Structures

BY MILTON HARRIS
The Textile Foundation

THE production of wools which are resistant to attack by moths, alkalies, bacteria, mold, and various chemical reagents has now been accomplished through extensive researches of the Textile Foundation.

Earlier researches in these laboratories have shown that many of the important mechanical, chemical and biological properties of wool are dependent on the presence of disulfide cross-linkages between the chain-like molecules which make up the fiber. For example, these cross-links inhibit plastic flow and thus aid in the long range elasticity of wool, a property which makes this fiber of particular value in the production of clothing, blankets and carpets. On the other hand, these same linkages are extremely susceptible to attack by many chemical agents such as alkalies and oxidizing and reducing agents. Wool containing ruptured cross-links is readily attacked by bacteria, molds, enzymes and other biological agents.

The relatively unstable disulfide cross-links are readily convertible to a stable type of cross-links through a process which involves the insertion of short hydrocarbon chains between sulfur atoms according to the following scheme: $R—S—S—R \rightarrow R—S—(CH_2)_n—S—R$. The product so obtained has the important long range elastic characteristics of wool and at the same time, its other properties referred to above are greatly enhanced. Naturally, the increased stability both to storage and to cleansing of such treated wools is of the greatest interest to large wool users, such as the Army.

HOSIERY SESSION

The Dyeing of Army Socks

By S. M. HAMILTON
Holeproof Hosiery Company

THE dyeing of half hose to meet the rigid specifications of defense contracts has made it necessary for the hosiery mills working on such contracts to develop an entirely new technique of hosiery dyeing. While this method is new to most of the dyers, it offers no difficulties that cannot be overcome in any dyehouse. The observance of accuracy in all stages of the processing will offset any lack of experience that the dyer may have in this type of dyeing.

Fastness requirements for the Vat Tan Shade necessitates the use of Vat colors. The dyestuffs employed are the pigment or dispersable types, which as the name indicates are readily dispersed in water. The dyeing then consists of padding the insoluble dyestuff into the goods and then the reduction of the dye in the fabric.

Since the dyeing of developed shades on hosiery is an every day occurrence in most of the hosiery dyehouses, little time will be needed to discuss that type of dyeing. Particular attention, however, will be given each phase of vat dyeing, the selection of color, penetrants, reducing agents, retarding agents, levelling agents and use of salt will be dealt with in more detail.

The Throwster Serves the Silk Hosiery Industry Without Silk

By GEORGE A. URLAUB, *Textile Consultant*

THIS paper shows the basic differences between silk and rayon and explains the methods of handling oiling and soaking for knitting purposes. Yarn sizes, constructions and twists are described for weaving and knitting yarns and the reaction of the knitting machines to these factors with silk out of the picture. The effect of mixing rayon with other fibers is discussed and conclusions drawn on the solution of these present problems.

The Dyeing of Nylon Hosiery

By P. H. STOTT
Technical Laboratory, E. I. du Pont de Nemours and Co.

THIS paper will review progress made in practical dyeing of nylon hosiery and will illustrate some of the reasons why acetate colors have proved to be generally

satisfactory for this purpose. Methods of selection and evaluation for suitable colors are discussed based on a study of the mechanics of the dyeing process. The dyeing and finishing of combinations of nylon with other fibers is reviewed as being of special interest at this time.

The Manufacturing of Full Fashioned Hosiery in Relation to the Finish

By Joseph Kelly

May Hosiery Mills

WITH the freezing of silk, there is a vital need for closer cooperation between the manufacturers of hosiery and the dyers. The latter should be more fully informed as to what fibers and what combination of fibers are being put into hosiery, so they will know how to dye it. Likewise, the manufacturers should be informed by the dyers what fibers should be knitted, so that they can be dyed properly. The paper concludes with suggestions for improved relations between the manufacturing and dyeing ends of the business.

Dyeing and Finishing of Full Fashioned Hosiery

By Virgil Hartquist

Wayne Knitting Mills

IN line with the preceding papers, an attempt will be made to present the problems of scouring, dyeing and finishing fibers used to replace silk in the full fashioned hosiery industry.

Although these fibers have been used in various combinations for a period of years, their use has been confined to extremely low-end numbers. Now these combinations must be dyed and finished to standards of people purchasing higher priced merchandise and a number of textile chemists and dyers are embarking in research of these fields.

Difficulties present themselves immediately after manufacturing when the cotton and various Ersatz fibers used in conjunction with nylon are subjected in preboarding to abnormal high temperatures and pressures of steam. Detergent chemicals must be examined because rayon throwing oils are totally different from those used on silk.

Temperatures for dyeing cotton must be altered in the presence of nylon and new methods and auxiliaries will be needed, however, the greatest need is the proper selection of dyestuffs for combination of cotton, both combed and mercerized, silk, nylon and various manufactures of viscose, nitrocellulose and cuprammonium rayon.

The paper will endeavor to answer some of these problems.

The Hosiery Situation Today and Outlook for Tomorrow

By Earl Constantine

President, National Association of Hosiery Manufacturers

THIS paper is a resume of the effect of the sudden stoppage of silk shipments to this country with an account of consequent dislocation of our domestic silk hosiery industry which in normal times consumes 90 per cent of all imported silk. Shifting production from a standard raw material to various substitute fibers has raised a multitude of problems, many of them of a technical nature and their immediate solution presents a challenge not only to the hosiery manufacturer himself, but also to his chemists and those of the allied dye and chemical makers. A plea is made for the united efforts of two great trade associations to cooperate and the speech closes with a prophecy of the future outlook of the hosiery industry.

LIGHT FADING CLINIC

Fundamental Concepts in Fade-Ometer Design and Operation

By E. H. Harvey

Atlas Electric Devices Co.

INTERNATIONAL use of the Fade-Ometer for the accelerated testing of color fastness over a period of almost a quarter century, climaxed by the approval of various standardizing agencies, gives this unique equipment a position of great technical and economic importance. This pre-eminence carries with it a heavy responsibility, however, for the manufacturer of such an instrument is expected to reflect technological advances in the industries served as rapidly as the most advanced members of the group think it desirable, yet avoid loss of official status with approving agencies by unauthorized changes, and escape the charge of introducing new models unnecessarily for obvious business reasons.

This paper traces the history of the Fade-Ometer from its conception during World War I, while America struggled to establish an infant dye industry, explaining the basic reasons back of each model brought out, and posing the question of how best to handle future developments in view of its semi-official standing.

The "National" Accelerated Fading Unit

By C. G. Ollinger

National Carbon Company

THIS paper includes a brief review of the research leading to the adaptation of the "flame" type "Sunshine" Carbon Arc as a light source for accelerated Light Fastness tests of dyed textiles. This desirable light source, which gives a closer approximation of the full spectrum of natural sunlight than any other artificial source of suitable intensity, has been built into an automatically operated Fading Machine. The physical characteristics of the energy from this arc are described. The mechanical features of the unit, including humidity adjustment and means of equalizing the light intensity, which tend toward close control and reproduction of fading results, are discussed.

Action of Accelerated Fade Tests on the Color of Wool Fabrics

By J. J. GLENN

Sidney Blumenthal Co., Inc.

DATA have been gathered to show the speed, reproducibility, and type, of the action of the Atlas Fade-Ometer operated at 140° F. These data have been taken on an automobile taupe shade pile fabric (pile composed of mohair and worsted). In addition, data have been compiled on undyed woolen swatches in Florida sunlight, 105° F. Atlas Fade-Ometer, and 140° F. Atlas Fade-Ometer. The amount of yellowing of the fiber in these three cases are compared. In connection with the yellowing of the fiber some temperature measurements with iron-constantan thermocouples inserted between the fibers and some moisture content measurements of the swatches at the time of exposure have been made. They are offered as specific reasons for differences in type of fade between accelerated fade tests, actual Florida sunlight tests and Shelton, Conn., roof tests.

ONE HUNDRED AND THIRTY-FOURTH COUNCIL MEETING

THE Council held its 134th meeting at the Chemists' Club in New York on Saturday morning, Sept. 20, 1941. Present were President Carl Z. Draves, presiding; William R. Moorhouse, Treasurer; Louis A. Olney, Chairman of the Research Committee; William H. Cady and P. J. Wood, Past Presidents; Dexter R. Kneeland and Clarence L. Nutting representing Northern New England; Peter J. Ariente and Frederic A. Prisley representing Rhode Island, George L. Baxter, Henry F. Herrmann and Harold W. Stiegler representing New York; William Ebersold, Charles A. Seibert and William A. Stringfellow representing Philadelphia; Robert W. Philip representing Southeast; Bertil A. Ryberg, Associate Research Director; Samuel L. Hayes, General Chairman, and Kenneth H. Barnard, Technical Program Chairman, for the General Meeting; and Harold C. Chapin, Secretary.

The Secretary's report of the 133rd Council meeting and balance sheet of Sept. 12, and the Treasurer's report of Sept. 16, were accepted. Reports from the Treasurers of the Northern New England and Rhode Island Sections were approved. Mr. Hayes and Mr. Barnard outlined and received approval of final plans for the General Meeting at Pinehurst on Oct. 31 and Nov. 1. It was voted that paid membership applicants be permitted to register for the technical sessions at the same rate as members. It was voted that a membership committee of three be appointed by the President to confer with local membership committees in guiding future membership additions in directions most beneficial to the Association.

The American Cyanamid and Chemical Corporation, the Arkansas Co., Inc., and Scholler Brothers, Inc., were elected to Corporate membership. Each of the following was elected to the class of membership specified, as of thirty days from publication of application, provided no objection be received meanwhile by the Secretary.

Senior

B. A. Alford	J. J. Desmond	L. W. Roberts
B. W. Ambler	J. P. Dougherty	A. Ruth
F. B. Brennan	J. W. Felix	W. A. Senechal
H. P. Bucklin	T. E. Lannefeld	S. F. Sylvester
R. F. Cashin	G. J. Littlewood	L. R. Stamm
J. Clausi	O. L. Masingill	F. Trebbien

SECRETARY'S BALANCE SHEET—SEPTEMBER 12, 1941

	Applications	*Dues, Regular and Reinstate.*	*Corporate and Sustaining*	*Miscellaneous*	*Bank Charges*	*Totals*
Brought forward Aug. 1, 1940, and received by Secretary to June 7, 1941	$1,792.50	$11,801.00	$2,945.00	$3,404.49	—$4.12	$19,938.87
Received by Secretary, June 7 to July 31, 1941	145.00	118.50	100.00	381.63*	— .50	744.63
Total brought forward and received, and transmitted to Treasurer, for fiscal year ended July 31, 1941	1,937.50	11,919.50	3,045.00	3,786.12	— 4.62	20,683.50
Less, brought forward Aug. 1, 1940	117.50	18.50	5.00	128.42		269.42
Leaving, receipts for fiscal year	1,820.00	11,901.00	3,040.00	3,657.70	— 4.62	20,414.08
Received by Secretary, Aug. 1 to Sept. 12, 1941, and transmitted to Treasurer	85.00	15.00	100.00	94.45**		294.45
Deposited by Treasurer with Secretary						$500.00

	Miscellaneous items				
Worsted tubing	$18.00*	$40.00**	Reporters	.35	1.50
Moth cloth	77.50	17.50	Launder-Ometer royalties	120.00	
Year Books	65.95	17.95	Publicity pamphlet	.25	.50
Dyed standards	39.53	14.00	Reprints	4.60	.50
Crock-meter profits	40.50				
Crock cloth	14.95	3.00		$381.63	$94.45

R. D. Conlan	R. E. Nebiker	S. I. Van Vliet
J. A. Cranage	E. Parker	H. R. Wilkinson
T. A. Dalton	G. E. Prime	W. C. Winkler
O. H. Demers	T. A. Redmon	

Junior

R. S. Bunting	W. Kaupin	L. A. Sullivan
S. J. Davis	M. Rhodes	R. P. Timmerman
J. B. Dunson	R. G. Schaubhut	E. W. Walsh

Associate

J. R. Glennon, Jr.	C. E. Mikels	G. G. Preston, Jr.

The following were transferred from other classifications to Senior membership: E. W. Schmalenberger, C. A. Spratt, H. A. Wormwood.

Respectfully submitted,

HAROLD C. CHAPIN, *Secretary.*

ONE HUNDRED AND TWENTY-SEVENTH MEETING OF THE RESEARCH COMMITTEE

THE 127th meeting of the Research Committee followed the Council meeting in New York on Saturday. September 20th, 1941. Present were Chairman Louis A. Olney presiding, W. D. Appel, P. J. Ariente, K. H. Barnard, G. L. Baxter, W. H. Cady, H. D. Clayton, H. Christison, R. F. Culver, J. N. Dalton, C. Z. Draves, W. Ebersold, A. C. Goodings, S. L. Hayes, H. F. Herrmann, A. E. Hirst, D. P. Knowland, O. F. Marks, W. R. Moorhouse, G. A. Moran, C. L. Nutting, R. W. Philip, F. A. Prisley, B. A. Ryberg, C. H. A. Schmitt, C. A. Seibert, H. W. Stiegler, W. A. Stringfellow, B. Verity, P. J. Wood, and H. C. Chapin, Secretary.

The Chairman reported on the weather fastness tests made upon olive drab dyed wool at the request of the Philadelphia Quartermaster Depot. Mr. Appel reported progress on correlation of results from new types of fading machines, and on development of intermediate standards of light fastness with a view to a complete set of eight. Mr. Ryberg discussed steps toward acceptance of our standard test methods by the American Standards Association, and particularly efforts to reconcile nomenclatures between tests, alike in other respects, from different associations. The Chairman, reporting on the Year Book, raised the question whether future books should be divided into two volumes, one published annually and the other biennially. The vote was for retention of the present single volume. Mr. Ariente and Mr. Cady reported briefly for Mr. Pingree's Committee on Determination of Sizing, Weighting and Finishing Materials. A letter was received from Ralph Hart, stating for the Committee on Analysis and Standardization of Sulfonated Oils, that a report on volatile solvents was nearly ready for publication. Mr. Marks described why his committee is finding it necessary to develop new tests for shrinkage of rayon crepe. Mr. Seibert reported that development of a new test for fastness to chlorine was well under way, and that his committee had found a buffer which would bring a variety of commercial hypochlorites at requisite dilution to a standard pH. On gas fading he said that the committee was not yet sufficiently satisfied with the oven in use to have it made for sale. A written report was received from Mr. Bonnar for the Committee on Moth Repellency. Dr. Stiegler stated that negotiations were under way for production of water resistance measuring apparatus. There was discussion of the effect of the conditions of wear, dry cleaning, etc., upon water resistant qualities. Mr. Appel said that the Federal government was particularly interested at this time in all sorts of accelerated tests simulating the effects of wear and weathering.

Respectfully submitted,

HAROLD C. CHAPIN, *Secretary.*

OUTING, RHODE ISLAND SECTION

A RECORD of four hundred members and guests attended the Tenth Outing of the Rhode Island Section under a broiling sun at the Norwich Inn, Norwich, Conn., on Friday, June 20th, 1941. In arrangements, Wilfred A. Lord, Chairman, was ably assisted by Robert R. Farwell, Allison R. Fletcher and Howard V. King on prizes, Louis D. Fleming on printing and publicity,

L. to R.—Arthur Veevers, Wilfred Lord, Chairman of Outing, and William H. Cady, Past-President

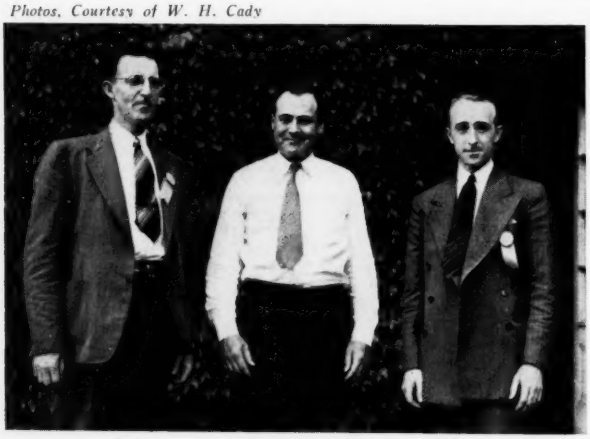
L. to R.—Lester Bailey, Ben Verity, Chairman-Elect of R. I. Section, and P. J. Wood, Past-President

Fred La Piana

Allison Fletcher, Chairman, R. I. Section

Howard King, Chairman, Program Com.

Photos, Courtesy of W. H. Cady



L. to R.—Robert Farwell, Treasurer of R. I. Section, Arthur Veevers, and Louis Fleming, Secretary of R. I. Section

A. Newton Graves on tickets and donations, Carroll W. Peck and Arthur Veevers on golf, Lester H. Bailey and Kenneth C. Everett on soft ball and horse shoes, and Ben Verity on hospitality. Golf prizes went to R. Brewer, D. Meikle and R. Hawes for first, second and third low gross; to E. K. Johnson, H. V. King and J. W. Timperly for first, second and third low net; and to W. A. Dainton, W. Kennedy, L. N. MacKenzie and H. S. Morrow for "nearest the pin." Golf prizes for guests went to R. Bloomstead, low gross, J. Mitchell, low net, and C. Dawson, second low net. In putting E. Stetson was first and J. R. Thompson second. A dinner of lobsters and steaks concluded the program.

Respectfully submitted,

IVER W. FALSTROM, *Secretary.*

Research Activities—

(Concluded from page P584)

its viewpoint on present test methods and the necessity for developing new or better methods of test.

The Committee on Fastness of Dyed Materials to Chlorine has been extremely active, since what appeared to be a simple matter of revision of the present method, proved to be a case of developing a completely new method. A number of factors were found to influence the results obtained in the present test, each of which must be studied and correlated with the others.

The Committee on Evaluation of Wetting Agents has contributed a method for the Comparison of Wetting Agents for Mercerizing Liquors which should be of considerable value.

The Committee on Physiological Effects of Textile Finishes has made a study of this subject due to the increase in the number of cases of dermatitis or skin irritations caused by the wearing of certain textile fabrics. The chairman of the Research Committee has been an active member of a joint committee representing the interests of a number of organizations. Several recommendations made by the A.A.T.C.C. to the general group have been adopted by them.

This condensed report merely gives a general picture of the activities of the Research Committee. The 1941 A.A.T.C.C. Year Book, which is now in the hands of members, should be consulted for further details.

Complete reports of all papers presented and discussions at the Annual meeting in Pinehurst will be published in future issues of the Reporter in the Proceedings.

TRADE NOTES • NEW PRODUCTS

• DYESTUFFS

Contents of *Dyestuffs,* for September, 1941, publication of the National Aniline & Chemical Co., Inc., 40 Rector St., New York, N. Y., are described by the following titles: Contributions from Turkish Archives to the History of Dyeing; Hand Block Printing; Problems in Dyeing Rayon Mixtures; Men's and Women's Shoe and Leather Colors, Spring, 1942; Dyestuffs in Warfare; Dyeing Cotton, Linen and Wool Goods with Indigo (Concluded).

• GENERAL RELEASE

General Dyestuff Corp., 435 Hudson St., New York, N. Y., has recently released a circular describing the following product:—

Algol Printing Scarlet GRN Paste—a vat dyestuff especially adapted for printing. It is in the form of a smooth, grit-free, non-settling paste. It produces bright shades of scarlet said to possess very good fastness to light, washing and chlorine. It is stated that it is well suited for both application and discharge printing on cotton or rayon. Circular G-286.

• BUTTERWORTH MICRO-SET SYSTEM

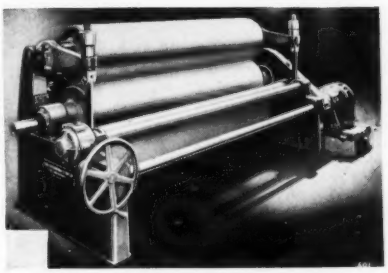
A recent improvement in Butterworth Dye House Padders is the Micro-Set System for applying pressures.

The Micro-Set System is said to take the guess-work out of the padding operation. It is stated that pressures are always under perfect control — from the very lightest pressures up to 10,000 lbs. on each side. It is claimed that this results in exact matches of shade, such as were formerly almost impossible to achieve on a padder and that it means that cloth delivered from the pad contains a minimum amount of moisture, which results in more efficient drying.

The micrometer pressure adjustment is easily and almost instantly applied by the hand wheel, which is also used to raise the roll from contact when not in use. There is another micrometer adjustment arrangement for applying pressure to each side of roll. A pressure dial makes it possible for the operator to return to exactly the same pressure after opening rolls.

Many padders now in operation have housings that are "adequate" but not good enough. It is claimed that superior padding results can be achieved on these machines when they are brought up-to-date with new Butterworth Micro-Set Housings.

The rolls in Butterworth Micro-Set Padders are built in sizes from 20" diameter down to 6" diameter. The tub is stainless steel with stainless steel immersion rolls. The Padder drives from a gear reduction motor, but compound gears can be supplied if desired. It can be operated as a unit by addition of friction let-off and winder or in range with other machines.



Butterworth 2-Roll Micro-Set Padder

In addition to 2-Roll Machines, Butterworth also builds 3-Roll Micro-Set Padders and Laboratory Machines.

• "WHEELCO COMMENTS"

Articles discussing instrumentation in the textile and other manufacturing industries will be featured in a new monthly house magazine launched last month by Wheelco Instruments Company.

The publication, "Wheelco Comments," in the current issue reports a saving of 20 per cent in labor, fuel and reduced spoilage realized by one company following installation of controllers, and gives other information of interest to users and prospective users of industrial instruments.

The current and succeeding issues may be obtained by addressing the company at Harrison and Peoria Streets, Chicago.

• HEADS DYESTUFFS GROUP, RED CROSS

Ernest K. Halbach of General Dyestuff Corp. again heads the Dyestuffs Group in the present Roll Call of New York Chapter, American Red Cross. Urging support of Red Cross work, he issued this official statement:

"By supporting the Red Cross in this year's Roll Call, one can make a definite contribution to national defense. Red Cross workers serve at all military and naval stations, giving aid to the personnel, while in home communities they help needy families of service men.

"New York Chapter provides blood plasma to the Army and Navy for transfusion use. It makes surgical dressings for the armed forces. The Red Cross obtains nurses for the Army and Navy. The Chapter trains nurses for nonprofessional service in hospitals. This year the Chapter also instructed 13,000 New Yorkers in first aid, 15,000 in water safety, 4,500 in home nursing, and 1,125 in nutrition.

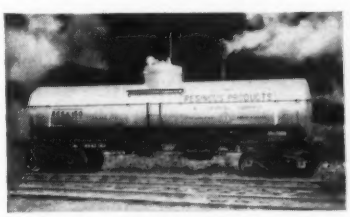
"By and through the Red Cross 47,087,000 in war relief has been shipped overseas. New York Chapter alone provided 360,479 garments and 1,440,454,000 surgical dressings; helped 15,000 New Yorkers seek word of 34,000 relatives in 51 war-affected countries; forwarded 9,000 orders to deliver food packages to war prisoners in German camps; its disaster canteen fed 1,500 child refugees arriving here.

"All this was in addition to the usual help to needy veterans and nurses. The Chapter's volunteers transcribed Braille for the blind; served in hospitals; distributed magazines to patients; carried poor patients to clinics; maintained a disaster relief service.

"Red Cross activities are maintained by voluntary contributions. This year, in order to carry on its national defense activities, the American Red Cross needs two-and-a-half times as many members as in 1940. I urge all to join during this Roll Call, November 11 to 30."

• STAINLESS STEEL TANK CAR

What is believed to be the first tank car in which the tank is constructed entirely of welded stainless-clad steel, has just been completed by General American Transportation Corporation at their Sharon, Pa., plant. The tank required 15,000 lbs. of "Silver-Ply" stainless-clad steel, supplied by the Jessop Steel Company of Washington, Pa.



Use of Jessop "Silver-Ply" in this equipment is claimed to prevent contamination of the contents of the tank, as the stainless cladding on the inside of the tank successfully resists the chemical attack which would have taken place had ordinary steel been used.

• ELECTED DIRECTOR

E. H. Little, President of the Colgate-Palmolive-Peet Company, announced that at a recent meeting of the Board of Directors in Jersey City, John K. Colgate was elected a Director of the company. Mr. Colgate is the son of Russell Colgate who, until his death on July 31 of this year, was a member of the Board of Directors. He is a great grandson of William Colgate, founder of Colgate & Co. in 1806, the oldest of the three companies which, through mergers in 1927 and 1928, became the Colgate-Palmolive-Peet Co.

• BOOK REVIEWS •

Handbook of Chemistry *(Fourth Edition). Compiled and edited by Norbert A. Lange, Ph.D. Assisted by Gordon M. Forker, B.S. (Chem. Eng.). Approximately* 1,935 *pages with an appendix of mathematical tables and formulas by Richard S. Burington, Ph.D.*

Eighty individuals for the most part experts in their particular line have contributed their criticisms and suggestions as well as text material in the preparation of this book. All of the subject matter in previous editions has been retained with the exception of the table entitled "Wave Length of the Principal Lines in the Emission Spectra of the Elements" which has been replaced with the two new tables "Qualitative Spectrographic Analysis and Sensitive Lines of the Elements." The information and arrangement of these two new tables will be more useful to those engaged in spectrographic work. Approximately 85 pages of new material has been added.

The following is a list of the tables not in the third edition and now offered for the first time:

Synthetic Rubbers.
Correction of the Boiling Point for Pressure.
Calculation of the Boiling Point of Organic Compounds.
Qualitative Spectrographic Analysis.
Sensitive Lines of the Elements.
Hammond's Cuprous Oxide and Copper Equivalents of Sugars.
Conversions of Specific Gravity to Density.
Azeotropic Mixtures.
Tank and Pipe Capacities.
Logarithms of Factorial n. Factorials.
Binomial Coefficients.

A fine quality of non-glare paper is used and the large page size facilitates use and accuracy. The sizes and style of the type makes for ease and consequent accuracy of reading. Another noteworthy improvement is the clarity of the column headings and explanations which accompany numerous tables.

This book will not only be found of value to chemists, but also to physicists, mineralogists, biologists, pharmacists, engineers, patent attorneys, and librarians as well as many others.

The Chemical Formulary, *Volume V, 676 Pages. Price* $6.00. *Published by Chemical Publishing Co. of New York, Inc., 234 King St., Brooklyn, N. Y.*

This constitutes Volume V of a series, the first of which was published in 1933. This includes a condensed collection of valuable, timely, and modern practical formulas for making thousands of products in all fields of industry. This, with the previous volumes, constitutes the most complete collection of chemical formulae which has ever been published. The book records very clearly all necessary data for making thousands of products for use in the home, office, school, factory and chemical laboratory. It is recommended as a decided time saver, as it eliminates a tedious search through a great number of library volumes.

The book also contains a collective list of all of the chemicals mentioned in the book and names and addresses of firms from which these chemicals and supplies may be obtained.

Since some mature users of this book have not had the good fortune to have had previous training or experience in the art of chemical compounding, a simple introductory chapter of directions and advice has been included.

Attention should be called to the fact that all of the formulas in the entire five volumes are different, therefore for complete reference all five volumes are necessary.

Symposium on Color. *86-pages. A.S.T.M. Headquarters, 260 S. Broad St., Philadelphia, Pa. Price:* $1.00, *heavy paper cover; cloth binding,* $1.25.

This symposium sponsored jointly by two organizations—the Inter-Society Color Council and the American Society for Testing Materials, stresses the importance of adequate specifications for color and discusses the use of color in the testing and evaluation of materials. Following the Introduction to Color by Deane B. Judd, who covers the attributes of colors, and the distinction between the psychological definition of color and the technical definition, there is a paper on "Color Specifications of Transparent Materials" by Francis Scofield who reviews critically the various sets of standards. R. H. Sawyer, whose paper covers "Hiding Power and Opacity" discusses the most significant theoretical and empirical relations which have been developed and those practical testing methods which have attained widest recognition. "Color Standards for Opaque Materials" is the subject of I. H. Godlove's paper, who points out that material standards may vary from haphazard and variable traditional objects which lead to unprecise color names, to groups of standards such as the Ostwald and Munsell systems. The two closing papers deal with the practical problems of color testing, one by A. E. Parker, entitled "Spectrophotometry and Color Evaluation" and the other by R. S. Hunter covering "Photoelectric Tristimulus Colorimetry."

Kapok. *A Survey of its History, Cultivation and Uses with Special Consideration of its Application to Thermal and Acoustical Treatments. By Stephen J. Zand, D. Eng. Published by the author, Forest Hills, N. Y.* 119 *pages,* 10 *half tone illustrations. Price* $1.50.

Kapok is a valuable fiber and extensively used but the public knows but little about it at least under that name. For many years the purchaser of a mattress was told that it was stuffed with "silk floss." In most instances both seller and buyer had in mind some form of silk

fiber and farthest from their thoughts was the fact that it was the product of a tall tree, probably grown in the Dutch East Indies.

The average book on fibers devotes from a short paragraph to possibly a page to Kapok, and we are glad to note that at last we have a volume denoted entirely to this fiber, which goes into detail regarding its source, properties and uses.

The headings of the ten chapters of the book will give some idea of its scope.

I The Kapok Tree.
II Cultivation.
III The Kapok Fiber.
IV Early Uses of Kapok.
V Kapok Materials.
VI Flameproofing of Kapok.
VII Kapok in Acoustical Treatments.
VIII Kapok as a Thermal Insulator.
IX The Kapok Trade.
X Summary.

At the end of the book there is a five page Bibliography.

Rubber and Its Use. *By Harry L. Fisher ,Director of Organic Research. U. S. Industrial Chemicals, Inc., and Air Reduction Co. Chemical Publishing Co., Inc., 234 King Street, Brooklyn, N. Y.* 1941. 128 *pages,* 20 *illustrations. Price* $2.25.

This book grew out of the author's seventeen years' experience as a research chemist in connection with the rubber industry. He discusses the source, properties and uses not only of natural but also synthetic rubber, in a concise but not too abbreviated manner. Furthermore the author's long experience as a lecturer affords a style which is readable and easily understood.

The headings of the ten chapters of the book will give the reader some idea of its scope.

I. Introduction.
II. History of the Rubber Industry.
III. Sources and Production of Crude Rubber.
IV. Properties of Crude and Vulcanized Rubber and the Importance of Vulcanization.
V. Compounding and Vulcanizing Rubber.
VI. Manufacturing Rubber.
VII. Latex Manufacturing Processes.
VIII. Synthetic Rubber or Elastomers.
IX. Rubber Derivatives.
X. A Last Word.

Organic Reagents in Inorganic Analysis. *By Ilbert Mellan, Ph. G., M. Sc., F.A.I.C., Philadelphia, Pa. The Blakiston Company,* 1012 *Walnut Street, Philadelphia, Pa.* 1941. 682 *Pages. Price* $9.00.

While here and there in the literature there have appeared methods of applying organic reagents to inorganic analysis, this book as far as we know, is the first to present a comprehensive practical and intelligible account of the far-reaching and important advances that have been made in the use of organic reagents.

Methods employing organic reagents are presented in a genuinely usable way for the industries, for teachers and research workers in chemistry. Wherever possible, the limitations of the test are given. Interfering substances are listed and instructions are given for the elimination of these interferences.

About 225 organic reagents are described, with a discussion of their function as reagents in inorganic analysis.

About 580 graphical formulas, showing the structure of the organic reagents, their reactive groupings, and the metal organic complexes formed are given.

About 230 qualitative and spot tests and about 240 quantitative tests (colorimetric, gravimetric and volumetric) are included.

A very useful bibliography is added.

The first 226 pages are devoted to Fundamental Theories and Principles; Organic Reagents, and Indicators. The remainder of the book takes up with detail application of these, to the following specific applications. Aluminum; Ammonia, Antimony, Arsenous; Barium; Benzoic Acid; Beryllium; Bismuth; Boric Acid; Borates; Bromine, Chlorine, Iodine; Cadmium; Calcium; Carbon Disulfide; Cerium; Chlorides; Chlorates; Chlorine; Chlorine and Bromine; Chromium; Cobalt; Columbium; Copper; Cyanate; Ferricyanic Acid; Ferricyanide; Fluorides; Fluorine; Gallium; Germanium; Gold; Halogen; Hydrocyanic Acid; Hydrogen Peroxide; Hydrogen Sulfide; Indium; Iodides and Iodates; Iridium; Iron; Lead; Lithium; Magnesium; Manganese; Mercury; Molybdenum; Nitrate; Nitrite; Nickel; Sodium Oxalate; Oxygen; Osmium; Ozone; Palladium; Perchlorate; Perchromic Acid; Persulfate; Phosphoric Acid; Phosphorus, Platinum; Potassium, Rhenium; Ruthenium; Selenium; Silica; Silver; Acid Potassium Phthalate; Sodium; Strontium; Sulfate; Sulfur; Sulfurous Acid; Sulfides; Sulfuric Acid; Tellurium; Thallium; Thiocyanate; Thorium; Cerium; Tin; Titanium; Tungsten; Uranium; Vanadium; Water; Zinc; Zirconium.

The Federal Labor Laws. *By Russell L. Greenman, Consultant in Labor Relations. Published by National Foremen's Institute, Inc., Deep River, Conn.* 82 *pages. Price* $1.50.

This book which also contains a section descriptive of the Walsh-Healey Act by Leslie Elwood Sanders, is intended as a manual for Department Heads and Foremen. It has been written for supervisors, gang leaders, department heads, and those in business and industry who have men working under their direction and upon whom the Wagner Act has imposed certain limitations in their dealings with workers, who are affected also by the Wages and Hours Act and the Walsh-Healey Act.

The book is intended to interpret in simple language those portions of law that are of direct interest to those who have to deal with labor.

(Continued on page 619)

Research in the CHEMICAL FINISHING OF COTTON

Planned by the Southern Regional Research Laboratory

WALTER M. SCOTT

Southern Regional Research Laboratory, Bureau of Agricultural Chemistry and Engineering
U. S. Department of Agriculture, New Orleans, La.

THE Southern Regional Research Laboratory is one of four laboratories authorized by Congress in the Agricultural Adjustment Act of 1938. In this act, the Secretary of Agriculture was directed to "establish, equip, and maintain four regional research laboratories, one in each major farm producing area, and, at such laboratories, to conduct researches into and to develop new scientific, chemical and technical uses and new and extended markets and outlets for farm commodities and products and byproducts thereof." It was further provided that such research and development should be devoted primarily to those farm commodities in which there are regular or seasonal surpluses.

In order to intelligently carry out this mandate of Congress, a special survey was made of all research activities relating to the industrial utilization of agricultural products in the four regional areas, and the results of this survey were published in Senate Document Number 65, U. S. Government Printing Office, 1939. During the survey, more than 10,000 present research projects of Federal and State agencies were reviewed and contacts were made with over 1,000 industrial concerns. In the report, the four "major farm producing areas" were defined geographically and certain farm commodities were selected to receive first attention in each of the areas. Furthermore, a tentative program of research to further the industrial utilization of each commodity was suggested.

The Southern Regional Area was defined to include the states of Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, Oklahoma, South Carolina and Texas. New Orleans was chosen as the site for the laboratory to be established in this area because of its central location. The commodities selected for research in this laboratory were cotton, sweet potatoes and peanuts.

COTTON RESEARCH

Cotton is the most important plant crop in the United States, not only from the standpoint of total cash farm value, but also from the standpoint of its widespread production and the number of people engaging in growing, ginning, handling and processing it. Therefore the major research effort of the Southern laboratory is being directed toward increasing the use of this fiber, as evidenced by the fact that three divisions in this laboratory are devoting their exclusive attention to some phase of cotton research.

The Cotton Fiber Research Division is undertaking an extensive program of fundamental research to determine the relationship of the chemical and physical structure of the cotton fiber to technically significant properties which influence the extent of its use. Special attention will be paid to the colloid properties of the cotton fiber, and to the nature of the degradation of cotton fiber and means of preventing or retarding it. Other investigations will be concerned with physical and chemical treatments of the cotton fiber to improve its properties while leaving it as a fiber.

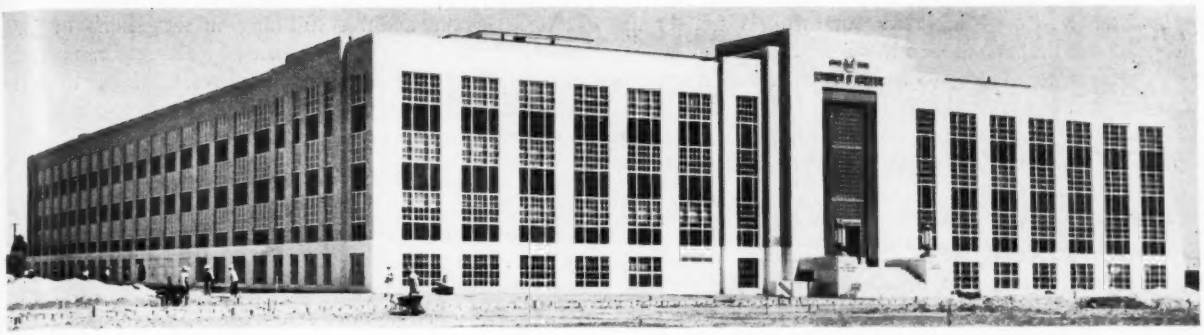
The Cotton Processing Division plans to develop new or improved cotton products which meet the physical, cost, and other requirements for specific uses. A textile mill is being installed in the pilot-plant wing of the laboratory so that commercial-scale studies can be made of the operations, such as carding, spinning and weaving, which enter into the three main divisions of cotton textile manufacturing, namely, yarn manufacturing, yarn processing and fabric production. An important phase of the work will be the development of new types of cotton processing machinery, as well as suitable testing equipment for evaluating the serviceability of the new cotton products.

The Cotton Chemical Finishing Division is entrusted with the development of new chemical finishes for cotton textiles, for the purpose of improving the existing properties of cotton and adding any other properties which give promise of stimulating consumer demand. The proposed organization of the research of this Division is discussed in detail below.

CHEMICAL FINISHING

The importance of chemical finishing in increasing the attractiveness and general sales appeal of cotton clothing and household fabrics has been recognized for some time. In industrial uses, also, chemical finishing has proven valuable in obtaining certain desirable properties in cotton fabrics, such as increased tensile strength and resistance to the deteriorating action of abrasion, heat and bacterial organisms.

Treatments with chemical compounds are capable of affecting many different properties in cotton. Each of these properties plays a part in making the cotton goods more acceptable to the ultimate consumer from the standpoint of appearance, handle or performance in actual use. Therefore, the program of the Cotton Chemical Finishing Division is designed to improve the desirable properties which cotton already possesses and impart to it new and more desirable properties. Some of the more important properties, which will receive careful attention, are listed below and mention is made of the fields in which each property is particularly important.



The Southern Regional Research Laboratory at New Orleans, showing the laboratory wing (left), and the administration wing. The pilot-plant wing is on the other side of the administration wing.

COTTON PROPERTIES

1. The properties which affect the appearance of cotton textiles and are distinguished by the sense of sight, are as follows:

Luster—important for ladies' dress goods, men's shirtings, and draperies.

Drape—Important for draperies and ladies' dress goods.

Color—important for practically all clothing and household fabrics.

2. The properties which affect the handle of cotton textiles, and are distinguished by the sense of touch, were defined by the Sub-Committee on Evaluating Textile Finishes on page 623 of the 1940 Proceedings of the American Association of Textile Chemists and Colorists. They are as follows:

Flexibility—ease of bending—distinguishing between pliable and stiff fabrics. An important factor in organdies, men's collars, white duck suitings, etc.

Compressibility—ease of squeezing—distinguishing between soft and hard fabrics. An important factor in ladies' and infants' underwear and some dress goods.

Extensibility—ease of stretching—distinguishing between stretchy and non-stretchy fabrics. Typified by knit goods as contrasted with woven goods.

Resilience—ease of recovery from deformation—distinguishing between springy and limp fabrics. An important factor in dress goods, suitings, plushes, blankets, carpets, etc.

Density (body or fullness)—weight per unit volume—distinguishing between compact and open fabrics. An important factor in almost all cotton fabrics.

Surface contour—divergence of the surface from planeness—distinguishing between rough and smooth fabrics. An important factor in linings.

Surface friction—resistance to slipping—distinguishing between harsh and slippery fabrics. An important factor in linings.

Thermal character—distinguishing between cool and warm fabrics. An important factor in underwear, blankets, etc.

3. The properties which affect the performance of cotton textiles and are distinguished by various serviceability tests are as follows:

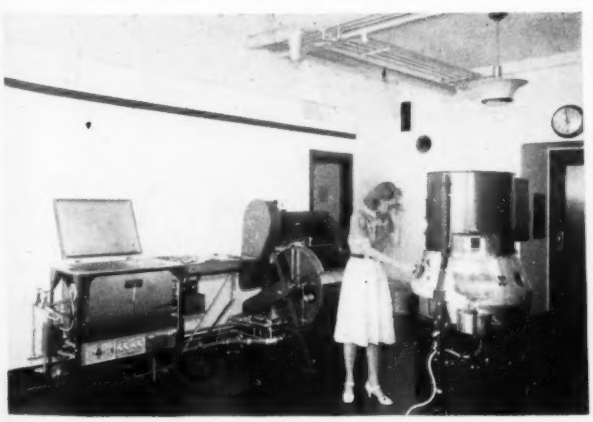
Ability to absorb and transmit moisture—important for underwear, athletic wear, wicking, absorbent cotton, etc.

Resistance of the color to washing, drycleaning, crocking, perspiration, etc.—important for all clothing and most household fabrics.

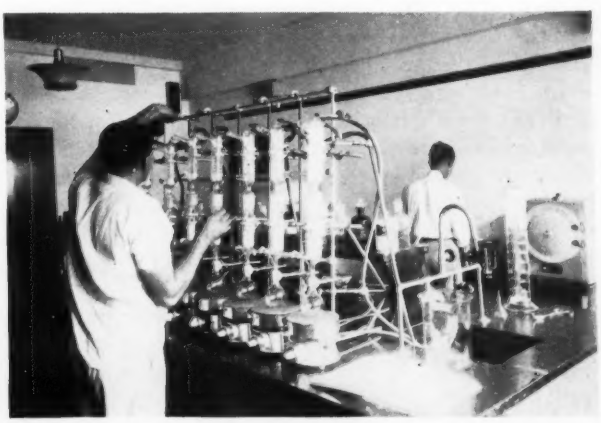
Resistance of the fabric to shrinkage—important for all clothing and some household fabrics.

Resistance to water (showerproofness or waterproofness)—important for tents, tarpaulins and many types of wearing apparel.

One of the testing laboratories in the cotton chemical finishing division. The following instruments are shown from left to right. Launder-Ometer, Laundry Wash Wheel, Fade-Ometer.



Cotton extraction equipment in the additive finishing section, cotton chemical finishing division.



Resistance to fire—important for awnings and for upholstery and drapery fabrics in hotels and theatres.

Resistance to mildew—important for tents, tarpaulins and bagging.

Resistance to abrasion (wear) — important for upholstery, men's wear, and industrial fabrics, such as various types of belts.

Resistance to chemicals—important for filter cloths.

FINISHING TREATMENTS

Chemical treatments of cotton textiles to improve their marketability can generally be divided into two groups: (1) the addition of chemical compounds to the cotton and, (2) the action of chemical agents on the cotton to alter its surface characteristics. Therefore, the chemical finishing research in the Southern Regional Research Laboratory is being organized in two sections: (1) An Additive Finishing Section and (2) A Modified Finishing Section.

ADDITIVE FINISHING

In the early days, the chemical compounds which were added to cotton in finishing could in general be classified in one of the following groups: (1) sulfonated oils or fats which softened the cotton; (2) starches, dextrins or gums which produced stiffness or gave increased fullness; (3) talc. clay or other mineral compounds which gave increased body and weight or promoted resistance to fire or mildew; and (4) Waxes or metallic soaps which promoted resistance to water. These compounds were capable of imparting to cotton fabrics a reasonably satisfactory appearance and handle but none of them were particularly fast to washing and generally the effect of the finish was almost completely lost after one wash.

During recent years, widespread developments in the manufacture of synthetic organic chemicals have made available to cotton finishers a large number of new products, most of which are comprehended in the following groups: (1) cellulose esters and ethers which add fullness and stiffness; (2) synthetic resins which are capable of producing fullness, stiffness, luster, and resistance to creasing, crushing or shrinkage; (3) sulfonated or chlorinated naphthalenes which are wetting agents and fireproofing agents, respectively; (4) phenol, salicyl or naphthenic acid compounds which are germicides and fungicides; and (5) fatty alcohol sulfonates and long-chain alcohol sulfates which are softening and wetting agents.

Many of these compounds are already finding a use in cotton finishing and it is planned to make a comprehensive survey in the laboratories of the Cotton Chemical Finishing Division to determine what desirable properties in cotton are affected by each compound. Consideration will be given to the development of new methods of application which will effect greater improvements in the properties in question or will reduce the cost of the treatment. Furthermore, considerable attention will be given to the development of new chemical compounds specifically designed to affect those properties which appear to be important factors in promoting the utilization of cotton textiles.

The current additive finishing investigations of this laboratory are naturally influenced by the requirements of our National Defense. At the present time, work is under way on two types of treatments for cotton to render it more useful as a defense material.

MODIFIED FINISHING

The treatment of cotton with chemical agents for the purpose of improving its properties was first initiated by John Mercer in 1844. His work led to the development of the process known as mercerization whereby the luster and the tensile strength of cotton are increased by treating it under tension with a strong solution of caustic soda. This process is extensively used by cotton manufacturers at the present time. In addition to caustic soda, the following chemical agents have been used commercially in finishing cotton textiles: (1) cuprammonium solution which is capable of producing luster and crispness; (2) strong sulfuric acid which is capable of producing a linen-like, a parchment-like, a wool-like or a transparent effect on cotton, and notably a permanent organdy finish; (3) strong acetic acid which produces surface acetylation of cotton and consequent improvement of its electrical insulating qualities; (4) p-toluene sulfonyl chloride which acts to "immunize" cotton so that it is not colored by the ordinary cotton dyestuffs; (5) organic salts of nitrogen bases which impart to cotton fabrics a durable softness and in some cases a lasting water-repellency.

Other chemical treatments have been recommended for cotton and have proven to be quite effective in laboratory-scale tests. Among these may be mentioned the following: (1) treatment with alkali and carbon disulfide to produce a stiffening action on and to impart a silky luster to cotton; (2) treatment with ethyl iodide or dimethyl sulfate in the presence of an alkali to increase the luster of cotton; (3) treatment with ethylene oxide to impart a permanent organdy finish; and (4) treatment with formaldehyde to render cotton fabrics more resistant to crushing or creasing.

The Cotton Chemical Finishing Division plans to investigate the more promising of the treatments mentioned above in order to determine what desirable properties of cotton are affected by each treatment, to evaluate carefully the extent of the effect on each property, and to so modify the treatments that they will effect greater improvements in the properties in question or that their cost will be materially reduced. Attention will also be given to the development of new chemical treatments which will be still more effective in imparting desirable properties to cotton.

TESTING

In order to properly evaluate and interpret the effects of the various additive and modified finishing treatments on the properties of cotton, the Cotton Chemical Finishing Division is purchasing and installing a wide variety of textile testing equipment. The following are some of the more important items in this category: (1) a Launder-Ometer and a Laboratory Wash Wheel for evaluating

(Concluded on page 619)

SILK EFFECTS ON PRINTED RAYON*

R. W. JACOBY

Ciba Co., Inc.

DURING the past few years, with the considerable increase in the use of rayon for dress fabrics, there has been a demand for the bright effects so long associated with silk prints. Now, with the elimination of silk, this demand will undoubtedly assume greater proportions.

In silk printing, acid colors, neutral dyeing acid colors, and certain direct colors were used to produce very vivid effects. These prints were fast to dry cleaning, but had limited wash fastness, and since garments made from such goods were usually dry cleaned rather than washed, they proved very satisfactory.

When the demand for silk effects on rayon arose, the question of fastness was also considered, and it was felt that if fastness comparable to silk prints was obtained, this would be satisfactory. Therefore, based upon this consideration, a study was undertaken.

Early in this study it was noted that many colors of the types used in silk printing had a slight affinity for rayon, and that this affinity could be materially increased by the addition of various materials. The exact action of these materials is a matter of considerable argument, but the most logical explanation is that these various reagents have a swelling effect upon the rayon fibers, allowing the colors to penetrate, and thus substantially increase the amount of color absorbed by the rayon fiber. Quite a wide variety of products were found to be effective in this regard, and some materials which were effective with some colors, did not help with others, so it was decided to make an effort to find one product which would have the widest possible application, and also be economical so that a simple formula could be devised, and one that would permit mixing various colors for shading purposes, which would not be the case if different products were used with different colors. As a result of this investigation it was determined that urea was a very satisfactory reagent with many of the direct and acid colors as well as being economical.

It was found that in using urea quite a large amount was necessary, even with small amounts of color so that the practice which was finally adopted was to use six times as much urea as dyestuff with a minimum of 20 per cent in the print paste as applied at the machine. In other words, if 4 per cent color was used the print paste should have 24 per cent urea, but if one-quarter per cent dyestuff was used the print paste should contain 20 per cent urea. With screen prints, however, where much more print paste is applied to the goods, the urea content can be considerably less.

The thickener used had quite an effect upon the color yield and brightness, and as these prints do not receive a severe washing after steaming, a readily removable thickener was preferred. Sodium alginate was found to be an excellent thickener for this type of printing as it gave good color yield, bright prints, and was readily removed in a light washing so as to leave the goods very soft for finishing.

The action of colors by the urea process was very selective so that proper choice could be made only by trial. In making the tests to decide upon a satisfactory line of colors it was realized that two types of processing would have to be considered. These are, long steaming and short ageing. Some plants were equipped for one type, and some for the other, but very few for both.

When this study was completed it was found that it is possible to have a full range of colors which will give satisfactory results when steamed for one hour, as well as a range of colors which are satisfactory when aged seven minutes. These colors comprised both acid and direct colors.

In printing by this method there is a certain amount of surplus color which washes off, as a result of which there is considerable difference of opinion regarding colors used. Some operators prefer to use as many acid colors as possible, feeling that as they do not tend to stain the whites in washing there is less danger in using them. On the other hand, some operators feel that the direct colors have more affinity for the rayon, and so will fix better, and that by careful washing with a good overflow of cold water, the surplus color can be carried away without staining the whites. However, many plants are using both types of colors indiscriminately and are obtaining very beautiful and satisfactory results.

With this selection of colors a full range of shades is available. They are printed in the usual way, then aged or steamed. Goods are then washed, and in washing it is preferable to start the goods in cold water with a good overflow to carry away the surplus color which washes off. Goods can then be soaped at 100°-110° F. if desired, washed, rinsed, and should receive a final passage through a solution containing a cation active fixing agent. This permits goods to be extracted without marking off, and prevents spewing or seeping of the color during drying. Goods are then finished in the usual way.

*In this article the word "Rayon" covers all regenerated cellulose rayons.

By this method of printing, rayon fabrics can be produced that have the clarity, brightness and bloom of silk prints, and shades are obtained which could not be produced by any other method.

As is often the case when a little progress is made, more is desired, so the same situation arose in urea printing. Having produced colors on rayon which had the same attractive appearance as silk prints, a demand then arose for two tone effects as had been produced by "conversion printing" on silk. That is, two tones, both of which could be controlled and be either a monotone or contrasting tones as compared to monotone effects produced by either a half etch or gum resist. By a half etch or gum resist, two shades could be produced, but they must of necessity be monotone effects, and only one tone could be controlled. The other would have to "come what may." By "conversion printing," however, two tones could be produced, both of them controlled and any number of variety of combinations could be produced. This is done by mixing dischargeable and non-dischargeable colors, printing on, and then overprinting with a discharge paste which would discharge the dischargeable color but not affect the non-dischargeable.

For instance, a green could be made with—

a dischargeable blue

a non-dischargeable yellow

then when over-printed with a discharge paste would show a yellow, or, a green could be made with—

a non-dischargeable blue

a dischargeable yellow

then, when over-printed with a discharge paste would show a blue; or, again, a green could be made with—

a non-dischargeable blue

a non-dischargeable yellow

a dischargeable blue

a dischargeable yellow

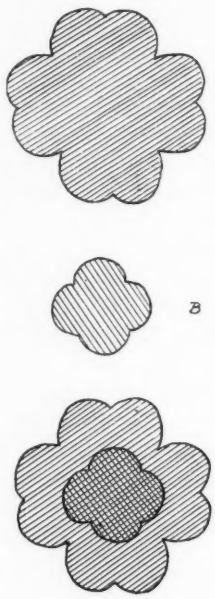
which, when over-printed with a discharge paste would give a light green.

Hence, it is seen that from a green could be produced a blue, a yellow, or light green, all controllable, rather than a monotone green which could not be controlled by a half etch or gum resist.

If the top color is dark enough the light color need not be a component part of the dark color. For example, a dischargeable black could have any non-dischargeable color added to it so that it could be discharged to a yellow, orange, red, helio, green, blue, brown, grey or any color desired. As the part produced by a half etch or gum resist, or by this method by the non-dischargeable color, is generally a high light in the pattern, it is usually a light shade, and so need not affect the top color too much, and the range of possible effects is very wide.

To produce these effects by the urea printing method necessitated finding a group of dischargeable colors, and a group of non-dischargeable colors, all of which would meet the other requirements of that process. A further study resulted in obtaining these two ranges of colors, but the range of non-dischargeable colors is very limited.

From the foregoing it can be readily seen that by printing on a mixture of dischargeable and non-dischargeable colors, and then overprinting with a discharge roller, that the use of this discharge roller doubles the number of colors in a pattern. In practice, the discharge roller is run last, for if it ran first it would act as a gum resist and weaken the color as well as discharge the dischargeable color.



The sketches herewith show roughly how the effect is produced. Figure A is on one of the color rollers and is printed with a mixture of dischargeable and non-dischargeable color. Figure B is on the discharge roller and is printed with discharge paste and falls on A. The result is shown in C where the cross-hatched portion is in the non-dischargeable color or colors, and the lined portion is the mixture as originally printed.

By care in design and coloring very beautiful effects are obtained, as well as multi-colored effects which are quite confusing as to just how many colors were printed.

As the number of non-dischargeable colors is very limited, further consideration of the question of conversion prints on rayon led to the development of other possibilities for producing the desired effects. The simplest of these other possibilities is to produce the non-dischargeable color with a vat color. This has been found to be practical and gives very satisfactory results as well as having the added advantage that the non-dischargeable color does not affect the shade of the discharge color. The method of operating this combination is to select dischargeable colors to produce the shade desired. To this is added the vat color necessary to give the non-dischargeable shade desired. The vat color is added as a pigment without any hydro or alkali, and so when printed on is present as a pigment. Over-printing is then done with an alkaline discharge paste which not only reduces the dischargeable color, but reduces the vat color so it is absorbed by the fibers. The vat color present which was not over-printed with the discharge roller is still present as a pigment and so washes off in the subsequent washing operation. By this method, for example, a dischargeable direct blue could be mixed with a vat yellow and printed by the urea method, then over-printed with an alkaline discharge paste. Where the discharge paste falls it would discharge the direct blue as well as reduce the vat yellow. In subsequent washing the unreduced vat yellow would wash out from the blue, leaving the color

unaffected, so a two-color blue and yellow effect would result. This method allows a much greater number of possible color combinations for neither color affects the other, each one, where it appears, appears alone.

Another unique feature of "conversion printing" is that mixtures of colors can be printed on, then over-printed with discharge paste with some sort of an over-print pattern, such as a scroll, with the result that the scroll appears in contrasting colors which looks like a most unusual fitting job, whereas there is no fitting to the pattern.

By means of the various methods described above, all types of rayon fabrics are now available in very striking patterns and color combinations, and regardless of what the relative merits of silk and rayon fabrics, the customer can no longer complain that they cannot obtain rayon prints styled and colored as silk prints were.

National Defense and Dyestuffs—

(Concluded from page 572)

The dyestuff industry does not need and does not want to be taken over by the government—neither as a whole or any sub-division of its production. Dyestuffs required for defense purposes can be produced in the quantities required to fill all defense contracts now in operation or likely to be placed if the comparatively small amounts of the needed raw materials are released for the purpose. Neither is it necessary to disrupt civilian production to effect this end. Even though only 70 per cent of vat color production goes into defense projects and 30 per cent for non-defense purposes, the amounts of raw materials of the sort already mentioned can be set aside for this industry without endangering the defense picture.

The popular slogan "Guns or Butter" can be rephrased in many ways. "Tanks or Uniforms" fits our picture. Tanks are valueless without crews and men must be clothed. We recall with horror the pictures of Russian hosts frozen in their tracks during the 1940 Finnish winter campaign. Inadequate clothing was the cause. No army in the world has the quality of clothing with which our forces are supplied. Our Army, Navy and Marine specifications are the highest and most exacting in existence. It is a pleasure as well as a duty for the dyestuff industry to comply with them and a little help will effect this end. The basic equipment is available plus the "will to-do" and the man power. The big problem lies in the shortage of certain raw materials which can be very easily corrected.

In closing it may be well to mention that the heavy production of dyestuff plant equipment does not necessarily mean desirable or profitable operation. Definitely the necessity for special dyes for defense purposes has forced the re-allocation of plant space and materials into these channels to the detriment of civilian production. The more a dyestuff manufacturer adjusts himself to the requirements of the defense program the greater is the dislocation of his normal plant production and the risk to his normal business when this present emergency is ended.

Research Activities of the Textile Foundation—

(Concluded from page 574)

REFERENCES

[1]J. Research NBS *27*, 89-103, RP1405; Am. Dyestuff Rptr. *30*, No. 17, 425-430; Text. Research *11*, 379 (1941).
[2]In preparation for publication.
[3]In preparation for publication.
[4]J. Research NBS *24*, 473-748, RP1309; Am. Dyestuff Rptr. *29*, No. 12, 287 292; Text. Research *10*, 323-333 (1940).
[5]J. Research NBS *25*, 305-308, RP1326; Am. Dyestuff Rptr. *29*, No. 18, 435-36; Text. Research *10*, 449-452 (1940).
[6]J. Research NBS *24*, 555-559, RP1290; Am. Dyestuff Rptr. *29*, No. 7, p. 244; Text. Research *10*, 269-279 (1940).
[7]J. Research NBS *24*, 13-23, RP1268; Am. Dyestuff Rptr. *29*, No. 1, 1-6; Text. Research *10*, 109-119 (1940).
[8]J. Research NBS *25*, 79, RP1359; Am. Dyestuff Rptr. *30*, 29; Text. Research *11*, 307-312 (1941).
[9]J. Research NBS *24*, 47-60, RP313; Am. Dyestuff Rptr. *29*, No. 13, p. 333; Text. Research *10*, 380-389 (1940).
[10]J. Research NBS *26*, 205-211, RP1370; Am. Dyestuff Rptr. *30*, No. 5, 107; Text. Research *11*, 238-244 (1941).
[11]In preparation for publication.
[12]In preparation for publication.
[13]J. Research NBS *25*, 61-69; RP1341; Am. Dyestuff Rptr. *29*, No. 14, 333-336; Text. Research *10*, 380-389 (1940).
[14]J. Research NBS *24*, 335-367, RP1286; Am. Dyestuff Rptr. *29*, No. 5, p. 103, 12 pages—cont'd in No. 6, .p 131, 7 pages; Text. Research *10*, 181-191 (1940).
[15]J. Research NBS *25*, 519-544, RP1343; Am. Dyestuff Rptr. *30*, 607; Text. Research *11*, 72-94 (1940).
[16]J. Research NBS *26*, 293-320, RP1377; Am. Dyestuff Rptr. *30*, No. 9, p. 223 (cont'd in No. 10 and No. 11); Text. Research *11*, 259-284 (1941).
[17]In preparation for publication.
[18]Paper No. 7. Division of Cellulose Chemistry; Abstracts of Papers, 102d meeting of American Chemical Society (1941).
[19]J. Research NBS *25*, 451-458; RP1338; Am. Dyestuff Rptr. *29*, No. *22*, 583-586; Text. Research *11*,, 15-23 (1940).
[20]J. Research NBS *26*, 93, RP1362; Am. Dyestuff Rptr. *30*, 25; Text. Research *11*, 117 (1941).
[21]J. Research NBS *27*, 81-88, RP1404; Am. Dyestuff Rptr. *30*, No. 14, 345; Text. Research *11*, 394-402 (1941).
[22]J. Research NBS *24*, 415-421, RP1290; Am. Dyestuff Rptr. *29*, No. 6, 213-216; Text. Research *10*, 221-228 (1940).
[23]J. Research NBS *23*, 471-477, RP1245; Am. Dyestuff Rptr. *28*, No. 20, 593-496; Text. Research *9*, 437-443 (1939).
[24]J. Research NBS *23*, 299-308, RP1234; Am. Dyestuff Rptr. *28*, No. 16, 412-417; Text. Research *9*, 374-383 (1939).
[25]J. Research NBS *26*, 93, RP1362; Am. Dyestuff Rptr. *30*, 53; Text. Research *11*, 200-217 (1941).
[26]J. Research NBS *24*, 743-748, RP1309; Am. Dyestuff Rptr. *29*, No. 12, 287-292; Text. Research *10*, 323-333 (1940).
[27]J. Research NBS *27*, 181-190, RP1412; Am. Dyestuff Rptr. *30*, No. 18, 449-456; Text. Research *11*, 415-428 (1941).

Read the Reporter for news of the latest developments in the Textile Wet Processing Field.

MODERN TRENDS IN FINISHING

A. Anticrease

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THE most striking developments in textile processing during the last 20 or 30 years have been in the line of finishing textiles. Not only has a practically new industry of textile auxiliaries and finishing compounds sprung up in the past 20 years, but a great many fundamentally new finishing processes have been developed. While for nearly 20 years dyeing, bleaching and printing processes have been systematically improved and developed along logically pre-determined lines on the basis of many years of practical application and theoretical research, new principles have been suddenly introduced and applied in finishing processes which were almost unknown only 20 or 30 years ago.

Up to around 1900 or 1910 the so-called finishing processes were little more than accessories of other chemical operations in the processing of fabrics, such as bleaching or dyeing operations. They were considered more of a nuisance and a necessary evil by the manufacturer than a legitimate part of textile processing. The consumer on the other hand seemed to be resigned to the fact that the finishing effect proper brought about by starching, calendering and the like would disappear in the first few washings. As a matter of fact, that's what happened in most cases: the luster of satins calendered with engraved heated roller—the "Schreiner Finish"—vanished in the first cleaning and the back filling generally employed for sheets and shirts proved to be rather short lived in a soap bath.

Naturally the general opinion formed was that these finishing processes were considered to be mystifications rather than real improvements or changes of the properties or qualities of textiles.

On the other hand the dyeing and printing industry progressed step by step. Diligent and systematic research in co-operation with practical textile application produced even brighter and faster dyestuffs. The basic colors, lacking fastness to light and washing were followed by mordant dyes, which were not as bright, but certainly were a step forward as far as fastness was concerned. But the greatest advance was made at the beginning of this century when the vat dyestuffs, the Indigosols and a little later the naphthols. Rapidogens, etc., were developed and brought on the market. It was now possible to produce the most difficult shades in a simple manner and with fastness properties which were not obtainable before that time.

Since the quality of dyed and printed textiles was greatly improved and their life prolonged by these new dyestuffs and special methods of application, it was natural that attention should have been turned toward the improvement of finishes. It was imperative—lest the improvements in dyestuffs were partly offset—to create a more lasting, permanent finish, or finishes, fast to laundering and dry cleaning. A superficial coating of textile fabrics merely filling the space between the threads with a starch or other paste certainly was inconsistent with the use of fast dyes. Obviously the solution of this problem could not be found by trying to make the coating—starch or other—more permanent, but had to be approached from the point of view of improving or changing the properties of the yarn—of the fiber itself—permanently, by chemical means.

The term of "super finishes" for these special finishing operations (from the German term: Hochveredlung) includes three groups, which were developed in a logical way from this idea of superior finishes. We establish therefore:

(a) The non-shrink finishes so far as they are produced by chemical means; for instance the process of Bener-Raduner, Switzerland[1], carried out by the application of synthetic resins in certain concentrations.

(b) The water repellant, especially the so-called hydrophobic finishes, brought about by a superficial (surface) alteration—mostly an esterification—of the fiber itself of which the fabric is composed. These processes are in contradistinction to the older coating processes by impregnating with metallic soaps, rubber dispersions, etc., clogging the spaces between threads.

(c) The anti-crease or crease-proof finishes, which constitute the main substance of this article.

Mentioned here should be the alkali soluble cellulose ethers (by Leon Lilienfeld) which, being only a coating principle and not involving any chemical change or reaction of the fiber, produce very fast, permanent coatings and finishes. They are, in a way, the ideal substitute for the conventional starch coatings. But these processes, like similar ones such as copper ammonia solutions or viscose solutions or alkali and acid treatments (Heberlein), will not be considered in this article. They will be dealt with separately. There is a certain connection between groups a, b and c. It will be noted, for instance, that fabrics made "non-shrink" by impregnation with solutions of

synthetic resins became crease-proof when the concentration of the resin was increased. By the same token it is to be noted that fibers, which show certain hydrophobic qualities—certain water repellant properties—because of their (relatively) lower swelling properties also have been shown to be somewhat crush-resistant. For example, it is well known that cellulose acetate does not swell to the same degree as other cellulose derivative rayons do. Cellulose acetate rayon is known to be more hydrophobe (water-resistant) and more crease-resistant than other rayons. The reason for this, as well as the different affinity to direct dyestuffs, is partly or wholly attributed to the reduced swelling property of acetate. It should be emphasized of course, that the difference in these properties of acetate and other cellulose rayons is only very slight and not sufficient to claim waterproofness or crease-resistance for acetate fabrics according to commercial standards or for commercial purposes. It can be seen in Brit. Pat. 494,761 (Stolte-Missy) that there is a certain connection between water repellency (hydrophobic quality) and anti-crease treatment. When fabrics are waterproofed according to the "Zelan" method (stearoxy methyl pyridinium chloride) a certain anti-crease effect is obtained at the same time and in the same manner. (First drying, then subsequent heating at high temperature.) The phenomena of anti-shrink, anti-crease, hydrophoby and lowering of swellability are so interrelated, that it is impossible to define any border lines.

HISTORICAL SURVEY OF THE ANTI-CREASE PROCESSES

The term "non-crease," or "anti-shrink," or "non-crumpling," finish cannot be found anywhere in the literature before 1926 (the year the Tootal Broadhurst Lee patents were filed at the London Patent Office), or more precisely up to 1928, the year the patents were published[2]. To be sure every textile man (and many consumers) regretted and complained about the lack of elasticity and springiness of cellulose fibers, but apparently no successful attempt had been made to change this characteristic property of cotton, linen, rayon and other cellulose fibers.

The most important discovery of T. B. L. was the surprising effect of synthetic resins, by themselves hard and brittle substances, hardened in (explicitly "within") the fiber. No doubt every available old or new substance or compound which is water-soluble tempts the textile chemist to try its suitability for sizing, printing or finishing processes. And so pre-dating the Tootal patents by one year there were already a series of patents in existence which protected an improvement of the fastness and calendering effects by mixing the usual ingredients with hardenable resins[3]. (Cotton Treating Syndicate, 1925.) But there it was not observed that these finishes, containing as they did synthetic resins, rendered the fabrics which were impregnated (or coated) with them crease-proof. A point of this fact was made in the introduction to the T. B. L. patent specification: "None of the prior proposals to incorporate a synthetic resin in a fabric or other material were made with the object of our present invention in view." Here stress is laid exclusively upon the effect and not upon the process, which by itself was known before. One of us read a paper at the meeting of the Internationaler Verein der Chemiker Coloristen in Basel (1935) dealing with the patent situation of the T. B. L. invention. A translation of this article was printed in an American textile publication[4] supplemented by comments of Oscar A. Geier, of Richards & Geier[5], comparing the patent situation abroad with conditions in the U. S. A.

Another patent (I. G., Faust, Esselmann, Henck[6]) also deals with impregnation of fibers with synthetic resins. Here it is interesting to note the reason and intended effect of this impregnation: it is proposed to decrease the swellability of the fiber! Since, as was stated before, there exists a connection between swellability and crease-resistance this patent can be said to be similar in its effect to the T. B. L. patent. There is no doubt that many others had tried impregnation with synthetic resins, but Tootal Broadhurst & Lee were the first who recognized the effect of these impregnations as to producing "crease-proof finishes."

Now the following has to be kept in mind: impregnation with solutions which form synthetic resins upon heating (polymerization) does not always produce crease-resistance and not with any or all fibers. The first T. B. L. patents include all sorts of fibers (including even animal fibers) but the practical textile technician knows that linen fabrics can hardly or not at all be made crease-resistant. Therefore it has been recognized that one cannot simply impregnate with a certain solution in order to produce a crease-resistant finish. This is, besides the chemical composition of the impregnating solution, dependent upon various other factors as will be attempted to show in the following.

MEASURING THE CREASE PROOF EFFECT

At first an exact explanation of what was meant by "crease-proof" was not furnished since it was necessary to formulate opinions and collect experience about this new term and what it implied. Later on, as these finishes were used more widely, the question of measuring the crease-proof effect also was clarified. There are several articles to be found in the literature about the apparatus used. We confine ourselves to cite the most important ones without going too deeply into this phase of testing. It is believed that it will be sufficient for an understanding of the subject of this article. The reader may refer to the literature should he desire more details on the question of testing. Saxl describes his gelometer with which resiliency is measured in *Melliand's Textilberichte*[7]. Herbert Schiefer reports on various apparatus known so far for measuring crease-proofing effects in the Journal of Research of the Bureau of Standards[8]. He cites as the three most important types those by which the creasing angle is measured, further the flexometer and improved (modified) compressometer.

WHAT CAUSES CREASEPROOFNESS?

There is no difficulty in testing the crease-proof effect

by measuring the angle which is formed after pressing or squeezing the fabric or determining the resistance to pressing. But it is very difficult to say or determine what causes the yarn or fabric to acquire this property of crease-proofness. Naturally it would be wrong and superficial to say that the synthetic resin itself is the cause, although it plays an important role in the process. On the other hand it is a fact that synthetic resins are not elastic for the most part. It certainly cannot be said, that elasticity is a typical property of the broad class of synthetic resins. Crease-proofness is most likely a combination of different factors and in this connection the following might be cited from the above mentioned paper read in Basel: ". . . if we remember that elasticity is not typical for all artificial resins, then the question has to be considered whether the thread really needs a filler which is itself elastic in order to be made non-crushable. It will be remembered that Prof. Haller has briefly referred to this matter in the March, 1935, issue of *Melliand's Textilberichte*[9] wherein he compared wool fibers with vegetable fibers. In accordance with this statement the latter becomes elastic only when it is filled, like a hose with water. It is apparent that this comparison may be further completed by saying that there must be a large number of substances outside of the group of artificial resins which will fill the lumen . . . although they themselves do not have to be elastic . . . Such bodies, however, which in the course of precipitation result in a crystalline, breakable deposit in the fibers must be entirely excluded . . . etc. . . . etc. . . ."

The factors which cause or lead to crease-proofness were explained in detail for the first time by Auerbach[10]. According to this author the determining factors are: the size of bending force, the diameter of the bend, time of bending, the moisture content of the fiber and the state of the fiber. He assumes that the synthetic resin is deposited in the interstices between the micelles, partially binding side valences of the molecule, partially forming additive compounds with formaldehyde. It should be noted that he discusses only the factors which influence greater or lesser crease-proofness, but not the causes themselves. But it is interesting that the effect of formaldehyde itself (without resin) is emphasized.

Much has been written about the question of how far the orientation of the micelle would influence crease-proofness. Here a wide divergence of opinion exists: Mark[11] assumes that non-oriented molecules improve crease-proofness, while Eloed[12] is of the opposite opinion. Since this question is by no means cleared up it is deemed best not to touch upon it any more in this discourse.

But it seems that crease-proofness is dependent upon two factors: first upon the filling or the content of the fiber (that is: the material with which the lumen of the fiber is filled) and upon the swellability of the fiber. This "filling" of the fiber will generally consist of synthetic resins or like compounds, not because phenoplastics or aminoplastics or other synthetic resins are elastic or resilient. The reason is that many representatives of this class of compounds are amorphous and insoluble.

The swellability of the fiber is influenced by changes upon the surface of the fiber. It is obvious that a fiber, which takes up moisture readily and thereby swells up cannot be as resistant to bending and creasing as a fiber which does not take moisture readily. Swellability and plasticity are related properties and a body which takes up moisture easily cannot be as elastic as a water repellent body.

It seems therefore that the ideal crease-proof effect can be accomplished only by a combination of these two factors: filling and non-sensitivity to water. Here however it is necessary to recall that a number of investigators have tried to substantiate the claim of Tootal Broadhurst, that the synthetic resin deposits are actually "within" the fiber and not merely on the surface of it. It was thought that it would be possible to detect the resin inside the fiber by dyeing it and so make it visible and distinguishable in a cross-section under the microscope. However it has not been possible to definitely prove this, because evidently the dye-reaction of cellulose on the one hand and of synthetic resin on the other hand are not sufficiently different. Without wanting to complicate matters by bringing up questions as to where the synthetic resin really deposit themselves: in the lumen of the fiber, or between the interstices or micelles of the fibers, we might suggest this as a possible theory or consideration: it could be possible that the cellulose is esterified superficially by formaldehyde and this cellulose methylene ester condenses later on with urea, the whole forming a complex, rather uniform compound. Perhaps the "cementing substance" present in cotton cellulose also plays a roll in the reaction. This might explain why the "resin deposits" cannot be seen in the fiber.

Of course it might be possible to produce a certain degree of crease-proofness with just one of these factors alone. Numerous patents which were issued after publication of the synthetic resin finishes are based upon this fact. Thus the use of formaldehyde by itself has been patented, which as is known, changes the fiber's surface by esterification of cellulose. Mentioned in this connection might be the patents of the Calico Printers' Association[13] and of du Pont[14]. Almost simultaneously with these, Boehme Fettchemie had the use of acid formaldehyde solutions patented[15]. Calico Printers emphasize that the fibers are rendered less liable to shrinking or creasing action. From this the connection of crease-proof and shrink-proof is evident. Similarly it is suggested to treat with formaldehyde and a non-oxidizing acid, HCl, plus amines (mono-oleylamines). The use of formaldehyde and formamid is protected for the same purpose.

Auerbach observed that cellulose, which was treated with formaldehyde alone, was no longer soluble in copper oxide ammonia. Formation of a methylene ester of cellulose seems to be indicated.

However we find that most patents which aim at obtaining a crease-proof effect are protecting the use of

synthetic resins or similar condensates. In the following this will be shown by a brief survey of such patents, granted in recent years. Only those representing the various groups will be cited:

Brit. Pat. 470,636 (Röhm & Haas): phenols, formaldehyde and amino alcohols, i.e., chlorophenylphenol condensed with formaldehyde and aminoethanole.

Brit. Pats. 466,015 and 468,677 (Ciba): aminotriazines (melamine).

Brit. Pat. 471,666 (Perlmuteer): condensation of sulfonated aromatic compounds (phthalysulfonate) and a sulfonated terpene.

Hung. Pat. 117,930 (Lazzlo Auer): cyanamide and formaldehyde.

Brit. Pats. 482,159, 493,938 and 501,206 (Wardle & Keyworth): formaldehyde, urea or thiourea, dibasic organic acids and alkylolamines.

Brit. Pat. 482,254 (Feller & Krey): urea-formaldehyde and oxidizing compounds (H_2O_2).

U. S. Pat. 2,147,401; Eckelmann—Koch (Gen. Aniline): condensates of imido ethers and ethylene diamine.

Brit. Pat. 506,507 (I.G.): condensation of aldehydes with arylene diureas (ethylenediureas).

Brit. Pat. 495,645 (I.G.): isocyanates or iso-thiocyanates condensed with formaldehyde.

U. S. Pat. 2,231,458 (Hercules Pdr.): nitro-isobutane-triole, combined with urea.

Ger. Pat. 692,322 (Geigy): dioxy-diarylsulfonates combined with formaldehyde.

U. S. Pats. 2,223,349, 2,223,948, 2,223,949 and 2,224,011 (Atlas Powder): resin-like products derived from hexahydric alcohols (hexitols) with boric acid.

This list of patents could be considerably enlarged, for new patents are being issued continuously claiming crease-proof finishes obtained with new and different combinations.

Also mentioned should be various mixtures of resin solutions with latex dispersions. The idea of these mixtures evidently is to avoid formation of crystallized condensates. A few of the patents along these lines are:

Brit. Pat. 486,926 (Tootal Broadhurst Lee): mixtures of latex and urea-formaldehyde in presence of potentially acid catalysts (phosphate of ammonia).

Brit. Pat. 490,135 (Perlmuteer): latex with alkylated naphtalene sulfonic acid as dispersing agent.

Brit. Pat. 469,575 (Sera Holding): crease-proofing: dispersed rubber and paraffine wax and resin in trichlorethylene.

As can be seen, the number of processes, compounds and claims is not only very large, but they are also rather lacking in systematic research. One fails to detect a logical, systematic line of approach and direction and it seems that in Brit. Pat. 486,926 cited above by Tootal, the original inventors combine with latex—evidently not satisfied with the results of the orgiinal process and method.

Attention is drawn to a previous article in this publication, in which Barnard and Powers describe the special types of resins suitable for textile purposes[18, 19].

Although, as mentioned previously, anti-crease or crease-proof finishing processes involve almost exclusively the use of synthetic resins or resinous condensations—there *are* processes which do not employ resin. For the sake of completeness two of these processes will be discussed briefly in the following.

One treatment for acetate rayon, patented by British Celanese, Ltd.,[20] proposes to achieve crease-proofness by destroying the superficial parallelization of the micelles. The filaments, threads, ribbons, etc., which have been stretched during the manufacturing process are treated with solvents or solvent mixtures in such a way that only the outer layers of the filaments are rendered plastic. In order to restrict the action to the outer layers of the filaments, the solvent or solvent mixtures are applied in diluted form. The treatment of cellulose acetate rayon yarns containing filaments of one denier are treated with aqueous methyl alcohol for thirty seconds, with tetrachlorethane-toluene for two minutes, with 10 per cent glycolmonoacetate for thirty seconds and with turkey red oil at 80° C. for fifteen minutes. Finally the goods are passed over a heated roller running in diethylene glycol.

A very interesting process of making cotton of rayon crease-resistant is the one patented by the Manchester Dyers[21]. It makes use of the property of rubber being vulcanized by sulfur and heat. The goods are first impregnated on a heavy padder with rubber latex. The amount of rubber taken up is figured at 5 to 10 per cent on the weight of material. After padding, the fabrics are hot-air dried, whereby contact with metallic surfaces is avoided. For the vulcanizing reaction the fabrics are then immersed in a boiling aqueous dispersion of sulfur and an accelerator, in the proportion of 10 volumes of solutions and 1 volume of goods, as follows:

	On Weight of Rubber
Colloidal sulfur	24%
Zinc oxide	2%
Accelerator	2%

When the bath is exhausted, after about 3 to 4 hours, the material is rinsed, dried and then heated in a drier at 115° C. for 20 to 45 minutes. It is claimed that the fabrics thus processed have a springy feel and are practically permanently crease-proof. It is also said that the feel and wetting properties of the fabrics are not altered by this treatment.

SOME MORE THEORETICAL AND PRACTICAL CONSIDERATIONS

One of the best and most comprehensive theoretical and practical discussions on the question of crease-proofing is to be found in an article by K. Quehl[22], which possibly has not received the attention which it deserves. It is established here that the crease-proofing effect diminishes in proportion to the force, pressure, time and moisture. (See review of Auerbach's article in the beginning of this article.) Besides these factors the number of single strands of which the whole yarn is composed is of im-

portance. Many thin strands will produce a better effect than fewer coarse strands. The fact is thereby established that the problem of crease-proofing is also influenced by mechanical factors. For instance a fabric will have different creasing properties depending on whether the threads are in linen binding or in satin binding. There will be a difference if a rayon yarn of say 120 den. is composed of 10 filaments of 12 den. each or of 40 filaments of 3 den. each. Besides, the author regards the swellability as of special importance, also the "filling" of the fiber with amorphous substances. In this connection he says that each fiber contains a certain amount of amorphous substances and a larger or smaller amount of crystallites. Fibers in which few such crystallites are present—as in the case of wool and natural silk—are more elastic and more crease-proof. Fibers in which the most crystallites are present—parallel to the fiber axis—exhibit the lowest crease-resistance. This is demonstrated in the case of stretch-spun rayons. Mark[23] made experiments with silk worms, causing them to extrude the silk at different speeds. When the silk worm produced the silk thread at higher speed the stretch was greater and the thread showed less resistance to creasing than threads spun at normal speed. The results show the same relation as rayons spun the regular way and rayons spun according to the stretch spinning process.

Quehl worked out a crease-proofing process based on the deposition of amorphous substances in the fibers according to the facts mentioned above[24]. Although no details are given as to the "Preska" process in this article, it seems to be identical with an American patent taken out by the Chemische Fabrik Rotta with Quehl quoted as the inventor[25]. The patent describes condensates of urea and mono-, di-, or polysaccharoses. It is said that sugars generally impart to the fabric an unpleasant and sticky feel. However the compounds described in the patent and intended for finishing purposes do not produce the same effect as the saccharoses. They are more soluble in water and crystallize more difficultly. The condensates are formed simply by heating or melting. Examples for di-saccharoses are: cane sugar, lactose, maltose; for polysaccharoses: raffinose. Crystallization can be brought about only by precipitating the solution with alcohol. As an example for producing the condensate the following is given: 66 g. urea are molten with 198 g. finely powdered glucose on the water bath. The same inventor was granted a French patent and an identical British patent[26], protecting amorphous substances to produce crease-proof finishes. To these substances are added dispersions of waxes, oils, borates or stannates. A similar invention is patented by Wall (Kali Manufacturing Co.)[27]. Here it is claimed that sucrose octaacetate in conjunction with a softening agent and a solvent are suitable for production of crease-proof finishes. Since no other explanation is given it must be assumed that the principle consists in "filling" the fiber with amorphous substances.

CONCLUSION

The problem of crease-proofing has been clarified to a certain degree through various theoretical and scientific observations as well as practical applications. It cannot be said however that the problem has been solved. It is not yet certain whether the orientation of the micelles plays an important part in the piastic (crease-resistant) state. According to Mark's experiments it is to be assumed however that a high parallel orientation of the micelles is unfavorable, if anything, in this connection. It may be recalled, that the highly orientated linen fiber is the most difficult one to crease-proof.

On the other hand, it seems to be established that the swellability and the filling with an amorphous substance are of importance for the crease-proofing effect. It becomes more and more evident that a mere decrease of swellability causes an increase of resistance to creasing (acetate; formaldehyde alone without resins). Therefore in the original crease-proof resin finishes formaldehyde alone was effective although this fact had not been recognized at first.

The filling mass seems to be an important supplement for the crease-proof effect. It has long been recognized that it must be in amorphous, not in crystalline deposition. The reason why resin-like solutions are used is that they fulfill these requirements — amorphous and insoluble — after condensation. It should be noted that in those processes in which substances other than resinous compounds are used, stress is laid upon the amorphous state of the deposit. Besides resins, many compounds are feasible which do not crystallize. The various sugars have been tried for this purpose, but other compounds will undoubtedly be found suitable. Resins however seem to be predestined for this purpose because they have the added property of reducing swellability through their surplus of formaldehyde.

It is not likely however that a general formula which will be suitable for every textile material or fabric will be found. As can be seen from the preceding paragraphs the matter of crease-proofing is not simply that of a chemico-mechanical finishing process, like other similar finishing processes. It is not definitely established whether the nature of the synthetic resin deposit, that is the amorphous filling of the fiber micelles by the condensate, is of the same or even greater importance than is the orientation of the micelles or the construction of the fabric (binding or denier of yarn).

Intriguing as the idea might be to impart properties of strength, water-proofness, etc., to the fibers by admixing the necessary ingredients to the spinning mass, it is hardly to be expected that an admixture of synthetic resin pre-condensates to the spinning solution would produce elastic filaments. Such attempts have been made (Fahlberg—List)[28], but only an improvement in tensile strength is claimed, not crease-proofness. Pickles[29] recommended latex emulsions as an addition to the viscose spinning mass. Emulsions of other filling substances

(Continued on page 618)

COLOR AND LIGHT SOURCES

NORMAN MACBETH

IN order to discuss color and light sources properly, some consideration should be given to vision, since without vision, there is neither color nor light sensation. If there is light, there is color and conversely, if there is color, there must be light. A brief survey here of the structure of the eye and the operation of the visual mechanism will facilitate this study. Humans see because the lens of the eye acts as a camera lens in transposing an image of the subject to the retina. The latter is made up of closely packed specialized nerve-endings which fall into two types, rods and cones. These names are derived from the shape that the endings assume; it is with the cones that we see color. The rods and cones are connected with nerves and subsequently this picture is transmitted to the brain.

On the retina and through the optical axis is an area known as the fovea. This area is oval in shape and is approximately 0.30 by 0.24 mm., subtending an angle of very nearly one degree. The fovea is specially constituted to allow good vision and most of our seeing and all our discrimination of fine detail results from focusing the object on the fovea. This area is greatly populated by cones and there are about 130,000 of them per square millimeter. On the retina there are of the order of three million cones, while there are about fifteen million rods. Approximately one million nerve fibers constitute the optic nerve.

In the absence of light, the eyes cannot function. With the presence of light, the pupil will contract. The first contraction is noted, according to Engelking[1], at 0.0001 f.c. and at 30 times this illumination (i.e., at 0.003 f.c.) there is a sufficiently definite contraction for him to designate this value as a threshold. This contraction is progressive up to 1000 mL.

The eye reacts peculiarly to low luminosities. For a luminosity of more than 0.01 lumen/sq. ft. there is photopic vision or light-adapted eyes. For a luminosity less than 0.001 lumen/sq. ft. people have scotopic vision or dark-adapted eyes. Dark-adapted eyes employ the rods, while light-adapted eyes use both the rods and the cones.

Visibility curves which are plotted with relative brightness as the ordinate and wavelength as the abscissa shift considerably with photopic and scotopic vision. With the photopic vision, maximum visibility is at 555 mμ, while with scotopic vision, the maximum peak shifts 48 mμ towards the blue, to 507 mμ. This last measurement is only approximate, but is the best data available and are the results of Hecht and Williams[2]. The region where the illumination causes a change from the photopic to scotopic vision is known as the Purkinge region and the shift in the visibility curve is known as the Purkinge effect.

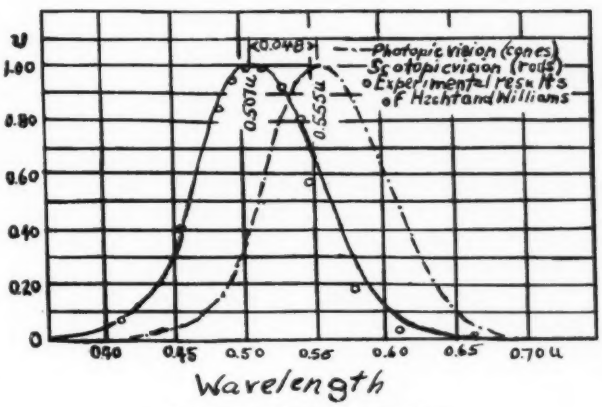


Fig. 1—Purkinge Effect Moon

Although the ability of the eye to distinguish color, hue, or wavelength differences is not as well known as its faculty for discerning variations in relative luminosity, some work in these fields has been done. Laurens and Hamilton[3] investigated the minimum wavelength interval which produced a noticeable difference in hue; they found four maxima of hue discrimination, two major ones at about 490 mμ and 575 mμ and two minor ones at about 430 mμ and 625 mμ respectively. The ability of the eye to perceive differences in saturation (chroma) of colors has been studied by Priest and Brickwedde[4]. They measured the minimum brightness of homogeneous spectral light which had to be added to one-half of a neutral (white) photometric field of constant brightness in order to produce a perceptible color difference between the two halves of the field. The ratio of the added brightness of the spectral color to the total brightness they call the least perceptible colorimetric purity.

To return to visual acuity, starting from dark adaptation, there is increasing acuity with increasing illumination. That visual acuity rises rapidly with increasing illumination from 0.01 to 15 foot-candles is incontrovertible. That its rate of increase falls off after a certain level has been reached seems indicated, but more data in this regard is needed. Some of the following figures may be most interesting:

Visual Acuity as a Function of Illumination

Visual Acuity (*In Minutes*[-1])	*Illumination* (*In Foot-Candles*)
0.277	0.01
0.943	0.259
1.85	17.75
2.30	1795.0

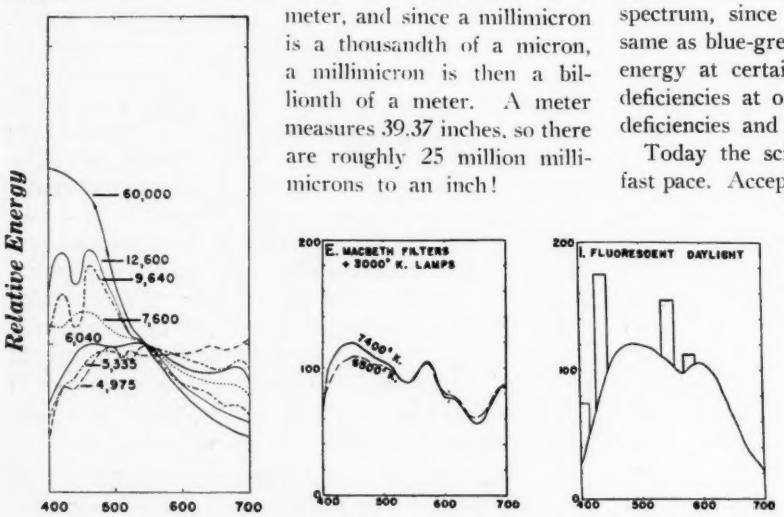
It will be noted that with increasing illumination there

is a sharp increase in acuity up to 18 foot-candles; however, it takes nearly 100 times that intensity to produce a 50 per cent increase in acuity thereafter. With respect to color grading and matching, it has been demonstrated by Nickerson[6] that in grading cotton (which may range in color from white to cream or light grey), an intensity of between 60-80 foot-candles is optimum. From this experience we might expect that many color matching problems in dyes and textiles would require 400-500 foot-candles where dark colors are being graded, and it so happens that colorists have chosen this value of illumination for such work.

It is of interest to know that visual acuity drops off with great rapidity as we move the image from the central area of the eye. This is accounted for by the rapid reduction in the cone population as we travel from the macula to the periphery, and the rapid decrease in the clarity of the retinal images as the distance from the macula increases. At the periphery all the optical defects of the eye are most apparent. Despite the fact that the cone population is negligible at the periphery, with sufficient stimulus, the color fields may be extended.

Now, consider radiation itself. It consists of many types, some of which are Hertzian, cosmic, ultra-violet, infra-red rays and visible radiation, which are known more commonly as light. All radiation travels at the same speed, about 186,000 miles/sec. The difference between the various types of radiation is merely wavelength. As large and small waves on a lake have different wavelengths, so do these various types of radiation. The visible range consists of waves whose lengths lie between 400 millimicrons (near ultra-violet) and 700 millimicrons (near infra-red).

To gain a better idea of the size of a millimicron, it might be stated that a micron is one-millionth of a meter, and since a millimicron is a thousandth of a micron, a millimicron is then a billionth of a meter. A meter measures 39.37 inches, so there are roughly 25 million millimicrons to an inch!



Natural Daylight Ideal | **Filtered Daylight Substitute** | **Fluorescent Light ?**

Fig. 2

Considering the visibility curve of the eye, it might seem logical to have radiation which was predominantly yellow-green, or a monochromatic light such as the Sodium D line, since these would fall at the sensitivity peak; however, this is not the case, and tests made by Ferree and Rand at Johns Hopkins showed that operators working under green illumination had the greatest eye fatigue, purple next, and daylight (or balanced illumination) best.

It has been proven that a person can work under daylight illumination for longer periods of time than any other. However, when fatigue approaches, a change to incandescent illumination produces a "second wind" and after a short period, a change back to daylight starts one off fairly fresh.

Of course there are several types of natural illumination; sunlight or daylight of various color qualities caused by dispersion, moonlight and starlight. Man has always tried to reproduce daylight. The first lamps were whale-oil lamps, then candles of various types, kerosene lamps, illuminating gas with its later improvements, then mantles, the carbon arc, the carbon incandescent lamp, up to the present gas-filled tungsten lamps. The closest approach to natural daylight has been the tungsten filament lamp filtered through Corning 590 Daylight filters. There have also been gaseous discharge lamps and the most accurate reproduction of daylight of the gaseous-discharge type is carbon dioxide.

A recent development in light sources is the new fluorescent lamp. This is essentially a mercury-discharge lamp, coated on the inside with various phosphors, which react to invisible ultra-violet radiation and produce visible radiation at high efficiency. One of these fluorescent lamps is known as "daylight," since it produces a white light. However, it is not a balanced and continuous spectrum, since on one hand it has mercury lines, the same as blue-green mercury lights in factories, and excess energy at certain wavelengths, and on the other hand, deficiencies at other wavelengths. The average of these deficiencies and excesses produce a white light.

Today the science of illumination is going at a very fast pace. Accepted standards three years ago are now obsolete. The introduction of fluorescent lighting has been a big step toward the optimum in lighting—daylight at high efficiency. However, the fluorescent lamp does not produce daylight as accurately as possible, nor as efficiently as the optimum.

Incandescent light sources operate at an efficiency of 20 lumens/watt with an ordinary life of 1000 hours (1000 watt PS52 type), the fluorescent white lamp up to 52 lumens/watt, the daylight up to 42 lumens/watt. Excluding the mercury-Mazda combination (which is an undesirable color reproduction of daylight), the efficiency

of fluorescent is high compared with 35 lumens/watt for filtered Mazda. This means that general illumination with daylight "comes of age" for color seeing, but up to the present time this source cannot replace the filter/Mazda type for accurate color control for reasons very clearly seen in the energy distribution curves shown above. The filter/Mazda type has a smooth continuous energy distribution. The sharp mercury lines present in fluorescent are actually very narrow and intense (as on Fig. 2) but are widened to show the total amount of energy present. Also, the filter/Mazda follows the curve of natural daylight most closely and it is very similar to a black body radiator* at specified color temperature**. This means that at 6700° K., or white light, there is a very even amount of each color in the spectrum. The fluorescent is unbalanced neglecting the mercury lines. There are deficiencies in the red and far violet and there is an excess of yellow-green radiation.

In color matching these variations make it practically impossible for a colorist to understand reactions and compensate for differences. There is one point that must be emphasized and that is the definition of color matching which is: "to select, make, or produce colors exactly alike regardless of illuminants or viewing conditions." To match under daylight does not assure a perfect match unless the colors have been previously matched under a two variant color matching lamp and the variation is only in brightness.

Some very startling advances have been made outside of illuminants themselves. For years it was concluded that to produce a daylight lamp there were two desired results. One was exact color reproduction, the other was amount of illumination. In 1935 there were daylight color matching lamps on the market producing exact color and 1200 foot-candles of illumination. Today there is exact color and only 300-400 foot-candles, with even more satisfaction than before; but, there have been added two other physical requirements, viz., diffusion and spread. Now colorists see no difference between artificial and natural skylights, with the exception that they think the artificial skylight is better because it never varies!

The desire for an exact skylight duplication came about in 1937 when considerable difficulty was experienced in obtaining suitable quarters for the many Department of Agriculture district offices requiring natural skylights. Miss Dorothy Nickerson undertook the problem of meeting these conditions through artificial skylights. A trial installation was made in her department there and many tests have been made over the period and up to the present time.

More accurate results have been obtained than with selected conditions of natural daylight. More than that, greater speed in classing results from having a uniform light, so that the classer does not have to compensate for the variations in natural daylight.

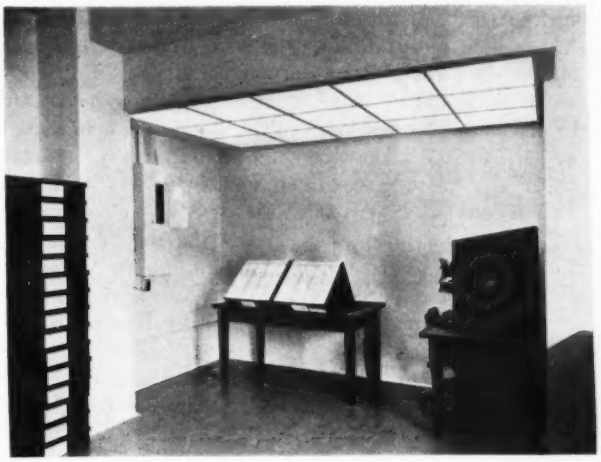


Fig 3—Nickerson Room

One of the largest cotton merchants has been testing a commercial model of an artificial classing light for nearly two years and now, here are the facts.

Classers who had previously considered artificial skylights impossible now feel that within a very few years

Fig. 4—Skylight for Color Grading

this skylight (pictured above) will be standard, eliminating wasted time on dark days and costly checking before

*A black body is a theoretical standard which completely absorbs all radiations incident, and emits radiation solely determined by its temperature. Of all incandescent bodies, at the same temperature, the black body emits the maximum total radiation.

**The color temperature of a light source is the temperature in degrees Kelvin at which a black body must be operated to give a color matching of the source in question.

shipment, since a standard light will assure the classer of the grade of each bale of cotton.

The artistic colorist of yesterday is a man of the unequipped past! With new instruments and lights, measuring color tolerances are considerably simplified. These new means of measurement were not too soon, either, since the layman has long been wondering about the carelessness of colorists in making poor colors and mismatches. However, the old colorist was handicapped by lack of the proper equipment. Originally, a match under one viewing condition and light was fortunate. Today, colorists are not only able to get very close matches under one illuminant, but usually the match will hold under all lighting conditions. Manufacturers are slowly setting up color specifications for the two variant matching, which assures a match under all lighting conditions, natural or artificial.

The two variant color matching lamp affords more than merely an opportunity to test the accuracy of a color match under typical daylight and artificial lighting conditions. Color matchers often may interpret the reaction of matches under north sky daylight (7400° K.) which has a preponderance of energy in the violet, blue and green regions of the spectrum, and under Horizon-Sunlight (2200° K.) which has an opposite balance of colors in its energy distribution, so that the desired end, an exact match, is achieved. An example may be given:

A large paper manufacturer had matched an orange sample to natural daylight and production was started. That night the color was compared again. This time it was under artificial incandescent light (about 2900° K.). The color was a very poor match. The new color was exceedingly more red than the original. Under natural daylight the original had appeared redder than the new match and red dye was added until it was a subjective match. Actually, the color causing the reddish appearance under north sky daylight was violet. The original was not red under incandescent. In this case, the colorist could have made good use of a two variant color matching lamp.

This type of instrument is the best available for production color matching. For color control, standardization and to improve color, a new instrument has been developed which actually measures and records in per cent reflectance or transmission the energy in the visible range that is reflected or transmitted by the object. This instrument is known as the G.E. Recording Spectrophotometer and was designed by A. C. Hardy of M.I.T.

The instrument is quite simple in principle but was very difficult to design in order to obtain accurate results. At the present time it is so accurate that it will measure 10^{90} colors. It has been stated that the trained eye can perceive over 2,000,000 color differences so that there is a machine that is many times more accurate than the eye[8]. The curve of the color from which we may take the spectrophotometric data may be converted into colorimetric terms in accordance with the method described in a report of the 1931 International Commission on Illumination. Much more information may be computed, such as determining the color gamut of a dye, ink, or other colored pigment. These can be represented on graphs with dominant wavelength and excitation purity as coordinates and on graphs with relative brightness and excitation purity as coordinates.

Having such an instrument in the laboratory of an industry concerned with color, not only enables a simplification of color and color matching, but enables the production of purer colors along with an accurate "record" of a color which is not subject to dirt, oxidation or fading. Each curve drawn on the spectrophotometer represents a particular color with reference to its chroma (purity), hue (dominant wavelength), and brilliance (degree of lightness or darkness). Two samples which produce the same curve have the same color. Commercially practical results may be obtained from a two variant color matching lamp since variations in the reflectance curve can be shown up under either of the two illuminants (7500° K. or 2200° K.), as each illuminant magnifies, visually, variations at each end of the spectrum.

For many hundreds of years, there was little research in color. Now, important strides are being taken, and each day we are learning of new improvements, theories and explanations which will be a big aid in solving our many color problems.

[1]Engelking, E.: Der Schwellenwert der Pupillenreaktion und seine Beziehungen zum Problem der Pupillomotorischen aufnahmeorgam. 2 eitschr, F. Sinnesphysial. 50:319-337, 1919.

[2]Hecht and Williams: The Visibility of Monochromatic Radiation and the Absorption Spectrum of Visual Purple. J. Gen. Physial, 5, 1922, p. 1.

[3]Laurens, H. and Hamilton, W. F.: The Sensibility of the Eye to Differences in Wavelength: Amer. Jo. Physiology, 65:547, 1923.

[4]Priest, I. and Brickwedde, F. G.: The Minimum Perceptible Colormetric Purity as a Function of Dominant Wavelength with Sunlight as a Neutral Standard. JOSA 14:306, 1926.

[5]Balinkin, I. A.: Industrial Color Tolerances. Amer. Journal of Psychology, page 428, Vol. 211, July, 1933, ISCC meeting, Feb., 1939.

[6]Nickerson, Dorothy: Artificial Daylight for Color Grading of Agricultural Products. Trans. IES, December, 1939.

[7]Moon, P. H.: Scientific Basis of Ill. Eng. McGraw Hill Book Co., New York, 1936.

[8]Foss, Carl E.: Application of Spectrophotometric Data in the Printing Ink Industry, JOSA, Vol. 28, October, 1938, p. 386.

Modern Trends in Finishing—

(Continued from page 614)

have been recommended, but the practical results of these suggestions are not known. Of course it would be most desirable to produce elastic fibers through suitable compositions of the spinning solutions, the same as it is possible to make delustered or colored rayons in the mass. But it seems improbable to attain this goal by analogy of admixture of resins or of pre-condensates. It seems more promising in case of the natural or chemical cellulose fibers to continue along the lines outlined above. But the chemical means also hold promise, such as adding groups containing nitrogen to cellulose, or admixture of amino compounds to the cellulose solution or reaction with imines or other highly reactive compounds of basic character. One of us has recently reported about the recent developments in this field[30]. While ultimately the ideal way of producing an elastic fiber would be by purely chemical

means, either chemical modification of the cellulosic fiber or producing chemically different fibers (such as the linear super polyamid fiber, "nylon"), there seems to be many possibilities yet to be explored in the application of synthetic resins, rubber and other substances to textiles.

LITERATURE REFERENCES

[1]U. S. P. 2,121,006, June 1938.
[2]Brit. Pat. 291,473 and 291,474, Applied Dec. 1, 1926; Accepted June 1, 1928.
Also U. S. P. 2,129, 403.
[3]Cotton Treating Syndicate, German Pat. 556,393, Applied for June 19, 1925.
[4]Rayon Textile Monthly, Nov. 1935; pp. 75 and Dec. pp. 65.
[5]Oscar A. Geier, President Richards & Geier, Patent Attorneys, 274 Madison Ave., New York, N. Y.
[6]German Pat. 535,234; Additional patent 537,036.
[7]Saxl, Melliand Textilberichte XIX pp. 45-38 (1938).
[8]Journal of Research, Bureau of Standards 1937, p. 19, and 1938 p. 20. See also: Am. Dyestuff Reporter, XXVI, p. 607.
[9]Melliand Textilberichte March 1935, p. 187.
[10]Melliand Textilberichte XIX (1938) pp. 512-15.
[11]See Weltzien, Melliand Textilberichte 1936 p. 245, explaining Mark's theory.
[12]Eloed & Etzkorn, Zeitschrift fuer angewandte Chemie 1938, p. 245.
[13]Calico Printers Association. E. P. 470, 097; Fr. p. 819,029.
[14]Du Pont E. P. 471, 779, Sept. 5, 1938.
[15]Boehme Fettchemie E. P. 471, 898; U. S. P. 2,108,520.
[16]I.G. Farbenindustrie U. S. P. 2,118,685.
[17]Du Pont E. P. 471,799 (See 14).
[18]Am. Dyst. Rep. 28; 18 pp. 514 (1939).
[19]See also Rayon Handbook (Schwarz & Mauersberger) Third Ed. pp. 409-425.
[20]Sowter, Brit. Celanese Ltd. E. P. 407,359.
[21]Manchester Dyers Ltd. (W. Watkins) E. P. 431,330.
[22]Dr. Kurt Quehl. Mell. Text. Ber. 1939, p. 76.
[23]Mark, Kunstseide 1932, p. 411 (Hart).
[24]Chemische Fabrik Rotta ("Preska Verfahren") F. P. 825,474; Swiss P. 196,948.
[25]U. S. P. 2,116,640.
[26]French Pat. 825,374; E. P. 505,970.
[27]U. S. P. 2,126,936.
[28]Fahlberg—List, Austrian Pat. 160,131.
[29]Pickles, U. S. P. 2,118,897.
[30]P. Wengraf: European progress in producing N-rayon and protein fibers. R. T. M. 19; pp. 752-3.

NOTE: Other articles in this series will follow in future issues.—ED.

Chemical Finishing of Cotton—

(Concluded from page 606)

the washing qualities of cotton fabrics; (2) a flat-bed press for use in the standard shrinkage test; (3) a Fade-Ometer for evaluating the effects of light on cotton fabrics; (4) a Flexometer for evaluating the flexibility; (5) a Compressometer for evaluating the compressibility; (6) a Drapemeter for evaluating the draping qualities; (7) a Densometer for evaluating the air permeability; (8) an Abraser for evaluating the resistance to wear; (9) special equipment for evaluating the resistance to water; and (10) a strength tester for evaluating the tensile strength and elongation of cotton fabrics.

COMMERCIAL APPLICATION

It is recognized that the development on a laboratory scale of new and attractive finishes for cotton textiles is only the first step toward the goal of making such finishes available in large quantities to the ultimate consumer. The Southern Regional Research Laboratory is being equipped to demonstrate on a pilot-plant scale the commercial practicability of each successful laboratory development. Beyond this point, reliance is being placed on the cooperation of cotton manufacturers and finishers to run practical trials on a full commercial scale.

Personal contacts have been established with nearly all of the large cotton finishing plants, both in the North and in the South, and the executives of these organizations have almost unanimously indicated their willingness to cooperate in every way possible.

Finally, it is planned to use every suitable means to acquaint consumers with the merits of these new developments in cotton textiles. To this end, a cooperative agreement has been effected with the U. S. Bureau of Home Economics. It is further anticipated that various women's clubs and State Extension workers will be interested in helping to arouse a nation-wide consumer demand for the cotton goods with the new finishes. With the stimulus of such a demand, there should be no difficulty in persuading the converters, wholesalers or other middlemen to purchase, and the manufacturers to produce such goods in large quantities. In this way the Southern Regional Research Laboratory would fulfill its mission of stimulating a larger utilization of cotton products.

Book Reviews—

(Continued from page 603)

American Cotton Handbook, *by G. R. Merrill, A. R. Macormac and H. R. Mauersberger. First Edition. 1,124 pages, 23 chapters, over 600 illustrations, photomicrographs, tables and charts. Size 5½" x 7¾". Copyright 1941. Published and Distributed by American Cotton Handbook Co., New York. Price per copy in U. S. and Canada $4.80, in other countries $6.00.*

This book of over 1,000 pages is the first attempt in many years to consolidate between two covers, all the latest, practical information on the historic, economic, social, technical as well as chemical phases of the cotton growing, manufacturing and processing industry in America. It is written in impartial, simple language, which even the layman and student can understand, reflecting present-day American mass production technic in the growing of cotton, its conversion into yarns and fabrics and the chemical processing of these materials into fashionable and merchantable piece goods. There is, at present, no American book that deals with this complete subject in an impartial, complete and authoritative manner. The authors are a well-known and able group of three practical men, who have achieved eminence in the textile field, according to Dr. C. T. Murchison, President of the Cotton-Textile Institute, Inc., who wrote the Foreword to this book. He states also that: *"It meets as no other single volume the requirements of practical usefulness."*

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The contents of the book are divided into 23 large chapters beginning with the Historical Background of the American Cotton Industry; Economic and Statistical Background; The Cotton Plant, Its Cultivation and Varieties; Ginning, Classitng and Marketing; Opening and Picking Operations; Carding and Combing; Drawing and Roving; Spinning of Cotton Yarns; Winding and Twisting; Manufacture of Sewing Thread and Handwork Cottons; Spooling, Warping and Slashing; Weaving and Designing; Manufacture of Knit Goods; Bleaching, Mercerizing and Dyeing; Printing and Dry Finishing; Manufacture of Terry Fabrics; Physical and Chemical Testing; Laundering of Cotton Materials; List of English Cotton Books; a 770 word Cotton Glossary and an Appendix dealing with the Use of the Statistical Method in Textile Testing as well as an Appendix on the Nomenclature of Dyes. A 24 page Subject Index completes the 1,000 page volume.

There are a number of special contributors carefully chosen by the authors to deal with specialized phases of the trade. such as A. H. Garside. who wrote the chapter on the Economic and Statistical Background; Professor E. R. Schwarz of M.I.T., who wrote the chapter on Physical Testing and Use of the Statistical Method in Testing; Chas. K. Everett of the Cotton-Textile Institute wrote the Promoting and Merchandising of New Cotton Products; M. P. Fox of Alabama Polytechnic wrote the chapter on Weaves and Designing; Robt. E. Smith of Fairfax Mills wrote the chapter on Terry Fabrics; Geo. H. Johnson of the American Institute of Laundering wrote the chapter on Laundering and H. Miedendorp, Jr., wrote the chapter on Thread Manufacture and Handwork Cottons, published for the first time in this country.

The book as a whole serves as an excellent up-to-date reference book for mill men, technicians, designers, brokers, chemists and laboratory testing men as well as salesmen, buyers, students and consumers of the entire cotton industry.

Dr. E. Herzog's ***"Reaktionstabelle der Kupenfarbstoffe"*** *(Reaction Tables of Vat Dyes). B. Wepf & cie., Basel.* 41 *pages. Second Edition.* (*First Edition* 1933.)

This booklet deals with the identification of commercial vat dyestuffs (incl. Swiss, German, French, American, English and Italian) on the fiber. The system is based on the colorations resulting when a small sample of the dyed fabric is treated with cold conc. H_2SO_4 followed by potassium persulfate, as well as treatment with alkaline hydrosulfite followed by acidification. Each color is assigned an arbitrary number: o colorless, 1 yellow, 2 orange, 3 red, 4 purple, 5 violet, 6 blue, 7 green, 8 brown, 9 gray or black. Thus each dyestuff has a characteristic 4-digit number corresponding to its colorations in the four tests mentioned. The first digit represents the acid hydrosulfite color, the second the alkaline hydrosulfite color, the third the persulfate and the last the color with cold conc. H_2SO_4. For example Leucosol Yellow GC (duP) gives in these tests the following colorations: orange, violet, yellow and yellow resp. and its code number is 2511.

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Before me, a Notary Public in and for the State and county aforesaid, personally appeared Alfred P. Howes, who, having been duly sworn according to law, deposes and says that he is the Publisher of the AMERICAN DYESTUFF REPORTER, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, printed on the reverse of this form, to wit:

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